Chile: Towards a Pragmatic Innovation Agenda

Yevgeny Kuznetsov
Knowledge for Development Program

Development Policy Review Workshop
Ministry of Finance and the World Bank
November 29, 2004
Santiago, Chile
Structure of Presentation

1. Analysis: the knowledge revolution and its implications for Chile
2. Implications: developing a pragmatic innovation agenda for Chile
3. Policy design: new industrial policy for Chile
4. Next steps
1. The Knowledge Revolution

- Ability to create, access and use knowledge is becoming fundamental determinant of global competitiveness

- Seven key elements of “Knowledge Revolution”
  - Increased codification of knowledge and development of new technologies
  - Closer links with science base/increased rate of innovation/shorter product life cycles
  - Increased importance of education & up-skilling of labor force, and life-long learning
  - Investment in Intangibles (R&D, education, software) greater than Investments in Fixed Capital in OECD
Greater value added now comes from investment in intangibles such as branding, marketing, distribution, information management.

Innovation and productivity increase more important in competitiveness & GDP growth.

Increased Globalization and Competition

- Trade/GDP from 38% in 1990 to 57% in 2001
- Value added by TNCs 27% of global GDP

Bottom Line: Constant Change and Competition Implies Need for Constant Restructuring and Upgrading.
Knowledge makes the Difference between Poverty and Wealth...

Thousands of 1955 Constant US $

Rep of Korea

Difference attributed to knowledge in Korea

Argentina

Difference due to physical and human capital in Korea

©Knowledge for Development, WBI
Implications for Latin America

With very few exceptions, Latin America’s growth performance has not been very strong over the past 20 years.

- It is risking falling further behind because it is not successfully tapping into growing global knowledge or exploiting its potential.
- It needs to develop strategies to use existing and new knowledge to:
  - Improve performance in traditional sectors
  - Exploit opportunities for leapfrogging
  - Develop competitive new sectors

- It Needs to:
  - Assess where it stands
  - Develop an action plan
Shares of World GDP (1980-2002)

% of World GDP:
- United States
- European Monetary Union
- East Asia
- LAC

©Knowledge for Development, WBI
Selected Countries: GDP 2002

China: $5732
South Korea: $784
Singapore: $97
Hong Kong: $178
Finland: $134
Brazil: $1312
Argentina: $401
Mexico: $879
Chile: $149

GDP per capita 2002

Growth 1990-2002 (%)

Average GDP per capita

©Knowledge for Development, WBI
Benchmarking Countries

- KAM: 76 structural/qualitative variables to benchmark performance on 4 pillars
- Variables normalized from 0 (worst) to 10 (best) for 121 countries
- www.worldbank.org/kam
- Multiple modes offering wide range of graphic representations and functionalities (1995 - Most Recent, comparison options)
- Aggregate Knowledge Economy Index (KEI) – average of performance in 4 pillars – KI
- Weighted and unweighted version – Innovation Variables
Knowledge Economy Index (most recent) breakdown

- Israel
- Korea
- Chile
- Russia
- Argentina
- Latin America

Legend:
- Econ. Incentive Regime
- Innovation
- Education
- Information Infrastructure

©Knowledge for Development, WBI
Knowledge Index (most recent) breakdown

- Korea
- Israel
- Russia
- Argentina
- Chile
- Latin America

Legend:
- Innovation
- Education
- Information Infrastructure
Growth Projections for Chile

Chile: Real GDP Per Capita - Alternative Projections 2004-2020

- Actual
- Projection 1: 1.09% TFP Growth
- Projection 2: 2.37% TFP Growth (Finland)
- Projection 3: 3.95% TFP Growth (Ireland)

©Knowledge for Development, WBI
Chile' Paradox: a Need for Pragmatic Innovation Agenda

- Good institutional and incentive regime
- Capable public sector (sense of mission, public sector entrepreneurship)
- Good but small innovation programs (Fundacion Chile, FONDEF, CORFO’ programs)
- Emerging sense of urgency (‘sabemos que hay entrar en nueva jugada…’)

Main issue now: developing **pragmatic innovation agenda**
- from good programs to coherent **innovation and enterprise upgrading system**;
- instituting ‘new industrial policy’ as **a process of discovery**
- **shared vision** of Chile as innovation-based economy (‘Chile 2025’)

©Knowledge for Development, WBI
2. Towards a Pragmatic Innovation Agenda

**What do we mean by innovation?**

- The diffusion of a product, process, or practice which is new in a given context (not in absolute terms).
- Technological innovations often go hand in hand with organizational ones.
- Innovation promotion often goes with enterprise upgrading.
Getting rid of innovation myths

- About the innovation process: it is not a linear process from research to market.
- About the source of innovation: key role of clients’ needs, suppliers’ ideas, etc.
- About high tech: it is its use which matters (not its production); needs a technical culture.
- About the innovator: it is not a single individual, but a group of people with complementary functions.
- About the role of government: it is crucial (including in form of direct support).
How innovation develops

- Not a linear process coming from research for going to the market, but a design centered project with ideas coming from multiple sources (clients, suppliers, etc); innovation does not derive from research, but it is the reverse (particularly in developing countries)
- Innovation is a project brought about by group of people (not a single individual): the inventor, the entrepreneur, the godfather, the gatekeeper
- An organic not a mechanistic view; innovation is like a flower that needs gardening
Government Role – Gardening Innovation

Watering (finance, support to innovation projects)

Removing weeds (competition, deregulation)

Nurturing soil (research, education, information)
Learning Capabilities of Chilean firms

**Research and Technology Development**
Very rarely present, mostly large firms

**Design and Engineering**
Capabilities rarely present in SMEs

**Technician and Craft Skills and Capabilities**
Strong skills sometimes present, though key skills often absent or weak

**Basic Operating Skills and Capabilities**
In SMEs, often weak, with limited and irregular upgrading
Why New Industrial Policy?

Industrial policy as a process to foster restructuring and technological dynamism
It is not about ‘picking winners’

An issue for each country is to acquire mastery over broader range of activities, not just concentrate on what one does best (Imbs and Wasziarg’s U-curve)

Diversification of the productive structure is discovery of which new activities have low enough cost to be profitable
This discovery process is not automatic.

Entering new market niches involves **significant fixed costs** and **significant risks**. Private sector alone will not do it.

Examples (beyond Asia’ high performers)
- Salmon in Chile
- Cut flowers in Colombia
- Soccer balls in Pakistan
- Software in India
- Aircraft in Brazil

State activism is behind virtually every successful diversification of productive structure
3. Policy Design: New Industrial Policy

How is new industrial policy different from ‘old’ industrial policy?

1. Institutional design which emphasizes high-power incentives to trigger private risk taking. Public sector offsets some fixed costs and risks but private entrepreneurship is the key. Example: Yozma program in Israel and direct support for techno-entrepreneurship before that.

2. Key role of public sector entrepreneurs – top policy makers engaged in organizational experimentation. Provision of policy space to experiment yet accountability and discipline for public entrepreneurs. Mistakes are unavoidable (ask Fundacion Chile) Example: first time, before Yozma, they got it wrong.

3. Focus on process, not outcomes – it is a private-public process of discovery to generate new opportunities for private agents. A dialogue over projects and programs between private and public entrepreneurs. Example: Fundacion Chile is a hub for this process of discovery.
New Industrial Policy

Evolution of industrial policy: three stages

• Sectoral/ Vertical industrial policy
• Horizontal industrial policy
• ‘New’ or pragmatic industrial policy
Sectoral/ Vertical Industrial Policy

- Best practice: subsidies contingent on performance (Korea, Japan)

- Worst practice: rent-seeking (almost anywhere else)

Issues:
- how to discipline business?
- ‘picking winners’ in modern fast-changing industries?
Horizontal Industrial Policy

• Related to the Washington consensus
• Focus on exports and FDI (hence important elements of sectoral industrial policies)
• Creating markets (e.g. venture capital market)
• Correct but insufficient and could be slow to yield results
• Disappointing spillovers from exports and FDI as a main concern
3. Policy Design: New Industrial Policy

New Industrial Policy

• Humble and ambitious at the same time (a paradox!)
  • **Humble**: accelerate what is emerging, don’t start completely from zero
  • **Ambitious**: ‘critical mass’, new clusters are at stake
  • Focus on bridge private-public organizations (like Fundacion Chile)
  • Focus on business networks linking global and local: Diasporas, innovation clusters and value chains
  • Focus on best performers in public and private sector: linking best public sector agencies with best and promising private sector performance
New Industrial Policy

- Humble and ambitious at the same time (a paradox!)
  - **Humble:** accelerate what is emerging, don’t start from completely from zero
  - **Ambitious:** ‘critical mass’, new clusters are at stake
  - Focus on *bridge private-public organizations* (like Fundacion Chile)
  - Focus on *business networks linking global and local*: Diasporas, innovation clusters and value chains
  - Focus on *best performers in public and private sector*: linking best public sector agencies with best and promising private sector performance
Three issues for new industrial policy:

1. Overall institutional framework to prevent rent-seeking
   Central issue for many countries, but not so much for Chile

2. Design of specific instruments and programs
   Sometimes too much attention is devoted to this issue

3. Creating a coherent innovation and enterprise upgrading
   system Central issue for Chile
4. Next Steps

Two parallel and (almost unrelated) developments

1. Cutting edge policy making. Chile (along with China) as accidental champion of new industrial policy
   • Many good institutions which is a source of pragmatic best practice for semi-industrialized economies
   • Sufficient number of public sector entrepreneurs

2. Cutting edge thinking
   • New cutting thinking on new industrial policy emerging simultaneously
   • and independently (D. Rodrik’ group in Harvard; M. Teubal’ group in Israel etc.)
4. Next Steps

- World Bank/ World Bank Institute as an intermediate between cutting-edge policy making and cutting-edge thinking
- Study tours and innovation policy workshop with strong participation From Chile: Finland (September 2004), Korea (December 2004)
- An idea: one day workshop between key Chilean policy makers in innovation/industrial policy and cutting edge thinking in this area
- Objective: a ‘self-discovery’ workshop to help policy makers to design Better innovation and enterprise upgrading system
- The workshop triggers a process of design and implementation of new industrial policy for Chile
4. Next Steps

Such process of self-discovery can focus on three elements

1. *Institucionalidad*: Institutional issues to transform and enhance National Innovation System

2. *Vision compartida de ‘nueva jugada’*: Big picture view: scenarios of Chile future one generation from now

   Sense of urgency; Shared vision of the future; A need for new big ideas

3. *Observatorio del Sistema de Innovacion*: Evaluation, monitoring and benchmarking of two issue:
   - of the process of self-discovery
   - of technological trends in the world and Chile’ position
Annex
Mexico

[Diagram showing various indicators such as GDP growth, Human Development Index, Tariff & nontariff barriers, Rule of Law, Regulatory Quality, Patents, Researchers in R&D, Scientific and technical journal articles, Secondary and Tertiary Enrollment, Adult literacy rate, Telephones per 1,000 (mainlines + mobile), Computers per 1,000 persons, Internet users per 10,000 people, Most Recent Data and 1995 data comparison.]

©Knowledge for Development, WBI
LAC: Performance Variables

Variables of performance

- Average Annual GDP growth (%): 1.66
- Unemployment rate, % of total labor force: 9.39
- Composite ICRG Risk Rating: 63.37
- GDP per capita: 6203.85
- Human Development Index: 0.75
- Poverty Index: 13.10
LAC: Economic Incentive Regime Variables

Variables of economic regime

- Gross Capital Formation (20.71)
- General Gov't budget balance as % of GDP (-3.91)
- Trade as % of GDP (59.77)
- Tariff & nontariff barriers (5.45)
- Intellectual Property is well protected
- Soundness of banks (4.48)
- Adequate regulation of financial institutions (5.92)
- Local competition (4.26)
LAC: Governance Variables

Variables of governance
LAC: Innovation Variables

Variables for innovation systems
LAC: Education Variables

Variables for education

- Adult literacy rate (% age 15 and above) (86.15)
- Average years of schooling (5.97)
- Secondary enrollment (68.60)
- Tertiary enrollment (22.52)
- Primary Pupil-teacher ratio, pupils per teacher (27.07)
- Life expectancy at birth, years (70.25)
- Flexibility of people to adapt to new challenges (6.61)
- Public spending on education as % of GDP (3.78)
- Prof. and tech. workers as % of the labor force (11.66)
- 8th grade achievement in science (420.00)
- 8th grade achievement in mathematics (392.00)
- Well educated people do not emigrate abroad (3.09)
- Availability of management education (3.76)
- Extent of Staff Training (3.28)
- National culture is open to foreign influence (6.91)
- Univ. education meets the needs of a comp. econ. (5.40)
Variables of ICT

- Telephones per 1,000 (mainlines + mobiles) (312.04)
- Main Telephone lines per 1,000 (150.14)
- Mobile phone per 1,000 (161.90)
- Computers per 1,000 (58.96)
- TV Sets per 1,000 (211.85)
- Radios per 1,000 (449.45)
- Daily newspapers per 1,000 (77.00)
- (6.60) ICT Expenditure as % of GDP
- (3.21) E-Government
- (2.44) International telecommunications, cost of call
- (570.09) Internet users per 10,000
- (38.62) Internet hosts per 10,000
- (0.62) Investment in telecom as % of GDP
Chile: Performance Variables

Variables of performance
Chile: Economic Regime Variables

Variables of economic regime

- Gross Capital Formation (24.40)
- General Gov't budget balance as % of GDP (-0.70)
- Trade as % of GDP (67.30)
- Tariff & nontariff barriers (8.00)
- Intellectual Property is well protected
- Adequate regulation of financial institutions (8.34)
- Soundness of banks (6.30)
- Local competition (5.70)
Chile: Governance Variables

Variables of governance
Chile: Innovation Variables

Variables for innovation systems
Chile: Education Variables

Variables for education
Chile: ICT Variables

Variables of ICT
R&D Expenditure, 1981-2000

R&D Expenditure as % of GDP

Source: World Bank SIMA Database

©Knowledge for Development, WBI
Chile, Latin America, Korea (most recent)
Chile, Latin America, Korea (most recent)
## KEI data – most recent

<table>
<thead>
<tr>
<th>Country</th>
<th>KEI</th>
<th>Econ. Incentive Regime</th>
<th>Innovation</th>
<th>Education</th>
<th>Information Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>7.71</td>
<td>7.12</td>
<td>8.48</td>
<td>6.99</td>
<td>8.26</td>
</tr>
<tr>
<td>Korea</td>
<td>7.70</td>
<td>6.10</td>
<td>7.88</td>
<td>7.80</td>
<td>9.03</td>
</tr>
<tr>
<td>Chile</td>
<td>6.39</td>
<td>7.57</td>
<td>5.45</td>
<td>5.72</td>
<td>6.83</td>
</tr>
<tr>
<td>Russia</td>
<td>5.69</td>
<td>2.43</td>
<td>7.57</td>
<td>7.52</td>
<td>5.25</td>
</tr>
<tr>
<td>Argentina</td>
<td>5.23</td>
<td>1.74</td>
<td>6.06</td>
<td>7.13</td>
<td>5.99</td>
</tr>
<tr>
<td>Latin America</td>
<td>3.96</td>
<td>3.74</td>
<td>3.03</td>
<td>4.39</td>
<td>4.68</td>
</tr>
</tbody>
</table>

## KI data - most recent

<table>
<thead>
<tr>
<th>Country</th>
<th>KI</th>
<th>Innovation</th>
<th>Education</th>
<th>Information Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea</td>
<td>8.24</td>
<td>7.88</td>
<td>7.80</td>
<td>9.03</td>
</tr>
<tr>
<td>Israel</td>
<td>7.91</td>
<td>8.48</td>
<td>6.99</td>
<td>8.26</td>
</tr>
<tr>
<td>Russia</td>
<td>6.78</td>
<td>7.57</td>
<td>7.52</td>
<td>5.25</td>
</tr>
<tr>
<td>Argentina</td>
<td>6.39</td>
<td>6.06</td>
<td>7.13</td>
<td>5.99</td>
</tr>
<tr>
<td>Chile</td>
<td>6.00</td>
<td>5.45</td>
<td>5.72</td>
<td>6.83</td>
</tr>
<tr>
<td>Latin America</td>
<td>4.03</td>
<td>3.03</td>
<td>4.39</td>
<td>4.68</td>
</tr>
</tbody>
</table>
Thank you