Slicing The Knowledge Based Economy in Brazil, China and India:
A Tale of 3 Software Industries

Globelics Academy
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(SOFTEX) – in Brazil Chapter
The International Software Market

- How to ride the global software & services market?
  - Value for 2001: USD 300 Billion
  - Value for 2008: USD 900 Billion (estimate)

- Packaged software market
  - Sales of $196 Billion in 2001
  - Traded share of sales is 15%

- Software related services
  - Market smaller than products
  - Traded share is 35%

- Offshore / outsourcing (BPO) exhibits strongest growth
  - in the US, 25% per year
  - In Europe, it will double between 2002 and 2005
## Software in Selected Countries in 2001

<table>
<thead>
<tr>
<th>Country</th>
<th>Sales (10^6 USD)</th>
<th>Sales / GDP</th>
<th>Industry Develop. Index</th>
<th>Domestic Industry Develop. Index</th>
<th>Exports (10^6 USD)</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>US**</td>
<td>200,000</td>
<td>2.0%</td>
<td>0.5</td>
<td>0.5</td>
<td>n.a.</td>
<td>1,042,000</td>
</tr>
<tr>
<td>Japan*</td>
<td>85,000</td>
<td>2.0%</td>
<td>0.8</td>
<td>0.8</td>
<td>73</td>
<td>534,000</td>
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<tr>
<td>Germany</td>
<td>39,844</td>
<td>2.2%</td>
<td>0.9</td>
<td>0.9</td>
<td>n.a.</td>
<td>300,000</td>
</tr>
<tr>
<td>India</td>
<td>8,200</td>
<td>1.7%</td>
<td>7.8</td>
<td>1.9</td>
<td>6,220</td>
<td>350,000</td>
</tr>
<tr>
<td>Ireland</td>
<td>7,650</td>
<td>7.4%</td>
<td>3.4</td>
<td>0.5</td>
<td>6,500</td>
<td>25,000</td>
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* Values for 2000 ** Values for 2002
Emerging Prescriptions from the 3 I’s?

- Nurture a Strong Human Capital Base
- Foster Entrepreneurship

<table>
<thead>
<tr>
<th>Develop a Large Export Base</th>
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<tbody>
<tr>
<td>Establish Strong Anchor to the US Market</td>
</tr>
<tr>
<td>- Export Base</td>
</tr>
<tr>
<td>- Multinational Investment</td>
</tr>
<tr>
<td>Leverage the US Links</td>
</tr>
<tr>
<td>- Diaspora</td>
</tr>
<tr>
<td>- English</td>
</tr>
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<td>- Culture</td>
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Single Track?
## Size and Growth of Software

<table>
<thead>
<tr>
<th>Million of USD*</th>
<th>Brazil</th>
<th>China</th>
<th>India</th>
</tr>
</thead>
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<tr>
<td>Sales in 1992</td>
<td>1,100</td>
<td>695</td>
<td>390</td>
</tr>
<tr>
<td>Sales in 2001</td>
<td>7,700</td>
<td>7,400</td>
<td>8,200</td>
</tr>
<tr>
<td>Annual Growth Rate</td>
<td>24%</td>
<td>30%</td>
<td>40%</td>
</tr>
</tbody>
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*Conversions of Local Currency to USD

Evolution of values in USD highly influenced by exchange rate fluctuations during decade.
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<tr>
<td>Brazil</td>
<td>7,700</td>
<td>1.5%</td>
<td>2.2</td>
<td>2.2</td>
<td>100</td>
<td>158,000</td>
</tr>
<tr>
<td>Korea</td>
<td>7,694</td>
<td>1.8%</td>
<td>1.1</td>
<td>1.1</td>
<td>35</td>
<td>n.a.</td>
</tr>
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<td>Ireland</td>
<td>7,650</td>
<td>7.4%</td>
<td>3.4</td>
<td>0.5</td>
<td>6,500</td>
<td>25,000</td>
</tr>
<tr>
<td>China</td>
<td>7,400</td>
<td>0.6%</td>
<td>1.8</td>
<td>1.7</td>
<td>400</td>
<td>186,000</td>
</tr>
<tr>
<td>Taiwan</td>
<td>3,801</td>
<td>1.2%</td>
<td>0.7</td>
<td>0.6</td>
<td>349</td>
<td>n.a.</td>
</tr>
<tr>
<td>Israel*</td>
<td>3,700</td>
<td>3.4%</td>
<td>1.8</td>
<td>0.5</td>
<td>2,600</td>
<td>35,000</td>
</tr>
<tr>
<td>Argentina*</td>
<td>1,340</td>
<td>0.5%</td>
<td>0.4</td>
<td>0.4</td>
<td>35</td>
<td>15,000</td>
</tr>
<tr>
<td>Mexico</td>
<td>&lt;1,000</td>
<td>&lt;0.2%</td>
<td>0.2</td>
<td>0.2</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

* * Values for 2000 ** Values for 2002
## Preconditions: Education, Research and Technology

<table>
<thead>
<tr>
<th>Variable</th>
<th>Units (year)</th>
<th>US</th>
<th>Brazil</th>
<th>China</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>World Rank (2001)</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>5&lt;sup&gt;th&lt;/sup&gt;</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
</tr>
<tr>
<td>NS&amp;Eng Grad</td>
<td>Total / Year (1997)</td>
<td>199,057</td>
<td>50,233</td>
<td>203,238</td>
<td>176,000</td>
</tr>
<tr>
<td>NS&amp;Eng Grad</td>
<td>/ 10&lt;sup&gt;6&lt;/sup&gt; pop (1997)</td>
<td>700</td>
<td>292</td>
<td>159</td>
<td>170</td>
</tr>
<tr>
<td>IT Graduates</td>
<td>Total / Year (2000)</td>
<td>51,236</td>
<td>17,847</td>
<td>41,000</td>
<td>71,000</td>
</tr>
<tr>
<td>IT Graduates</td>
<td>/ 10&lt;sup&gt;6&lt;/sup&gt; pop (2000)</td>
<td>180</td>
<td>101</td>
<td>32</td>
<td>69</td>
</tr>
<tr>
<td>ICT Expenses</td>
<td>% GDP (2001)</td>
<td>7.9%</td>
<td>8.3%</td>
<td>5.7%</td>
<td>3.9%</td>
</tr>
<tr>
<td>PCs</td>
<td>/ 1,000 pop (2001)</td>
<td>585</td>
<td>44</td>
<td>16</td>
<td>5</td>
</tr>
</tbody>
</table>
## Market Structure in Brazil, China & India

<table>
<thead>
<tr>
<th></th>
<th>Brazil</th>
<th>China</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sales</strong></td>
<td>7,700</td>
<td>7,400</td>
<td>8,200</td>
</tr>
<tr>
<td><strong>Market Focus</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>56%</td>
<td>58%</td>
<td>80%</td>
</tr>
<tr>
<td>Products</td>
<td>44%</td>
<td>42%</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Exports</strong></td>
<td>1.5%</td>
<td>5.5%</td>
<td>76%</td>
</tr>
<tr>
<td><strong>Firms w/ Software Activity</strong></td>
<td>10,700</td>
<td>10,000</td>
<td>n.a.</td>
</tr>
<tr>
<td>Software Firms</td>
<td>5,400</td>
<td>5,700</td>
<td>2,800</td>
</tr>
<tr>
<td>Employees</td>
<td>158,000</td>
<td>186,000</td>
<td>350,000</td>
</tr>
</tbody>
</table>
## Leading Firms in the 3 Nations

<table>
<thead>
<tr>
<th>BRAZIL</th>
<th>INDIA</th>
<th>CHINA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
<td>Sales Origin</td>
<td>Company</td>
</tr>
<tr>
<td>Microsoft</td>
<td>362</td>
<td>TCS</td>
</tr>
<tr>
<td>SERPRO</td>
<td>372</td>
<td>Infosys</td>
</tr>
<tr>
<td>Comp. As.</td>
<td>260</td>
<td>Wipro</td>
</tr>
<tr>
<td>EDS</td>
<td>240</td>
<td>Satyam</td>
</tr>
<tr>
<td>CPM</td>
<td>204</td>
<td>HCL Tech</td>
</tr>
<tr>
<td>Accenture</td>
<td>194</td>
<td>Patni</td>
</tr>
<tr>
<td>Oracle</td>
<td>182</td>
<td>Silverline</td>
</tr>
<tr>
<td>SAP</td>
<td>124</td>
<td>Mahindra BT</td>
</tr>
<tr>
<td>Politec</td>
<td>104</td>
<td>Pentasoft</td>
</tr>
<tr>
<td>Consist</td>
<td>77</td>
<td>HCL Perot</td>
</tr>
<tr>
<td>Microsiga</td>
<td>72</td>
<td>Mascot</td>
</tr>
<tr>
<td>CPqD</td>
<td>64</td>
<td>NIIT</td>
</tr>
<tr>
<td>DBA</td>
<td>62</td>
<td>I-Flex</td>
</tr>
<tr>
<td>CITS</td>
<td>57</td>
<td>Mphasis</td>
</tr>
<tr>
<td>Proceda</td>
<td>52</td>
<td>Mascon</td>
</tr>
</tbody>
</table>

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Origin: US, IN, BR, CN, JV, GER

Understanding Role of Multinationals

- **Local competitors in products and services**
  - May affect local producers - but also strengthens market
    - e.g. SAP competes with local ERP Producers
  - The realities...
    - Stronger in Brazil
    - Moderate in China and India

- **Local market as base for development in international arena**
  - Supports local industry and is welcomed
    - e.g. Siemens PBX in Brazil or TI development center in India
  - The realities
    - Strong in India
    - Moderate to low in Brazil and China
### India - China - Brazil Considerations

<table>
<thead>
<tr>
<th></th>
<th>Focus</th>
<th>Differentiators</th>
<th>Opportunities</th>
<th>Barriers</th>
</tr>
</thead>
</table>
| **India** | • Low Tech Services  
 • Exports | • Deep Labor Pool  
 • English  
 • Process Maturity  
 • Global Links | • Business Process Outsourcing  
 • High Level Export Services | • Wage Pressure  
 • Domain Knowledge  
 • Low-End Competition |
| **China** | • System Integration  
 • Products | • Government Action  
 • Strong Domestic Market | • Export Services  
 • Hardware Links  
 • Multinationals | • Process Capability  
 • Small Firms  
 • Open Market Experience |
| **Brazil** | • Verticals - Prod+Serv  
 • Products | • Domestic Market  
 • Strong Client Sectors | • Export Higher Level Services in Verticals  
 • Export Products | • Small Firms  
 • International Visibility  
 • No Active Policy |
Conclusions & Takeaways for 3 Nations

- **Large and over-developed industries**
  - Sell USD 8 Billion in Software
  - Annual growth rates on the order of 30%

- **Preconditions for past success & bright future**
  - Demand at home and/or abroad
  - Human and financial capital
  - Government policy - can have stifling or leveraging effects

- **Industry development may follow different paths**
  - Critical to find the right development anchor!
  - Strong service exports for India
  - Vibrant domestic products/services for Brazil and China

- **Challenges ahead remain...**
  - Competition between nations will become more acute
  - Important to leverage industry strengths
  - Multinationals will play increasing role
  - NO SET WINNERS!
Paths for China and India

**CHINA: A low level but strengthening industry**

- Sector Linkages - Users and manufacturers
- Export Services - Replacing India in low level
- Spillovers of multinational interest in China

☞ **NEED: Process Capabilities & International Marketing**

**INDIA: Tension between value and volume**

- Climbing service value chain & enter product markets
- Invest in BPO, ITES and other
- Face multinational competition with domestics

☞ **NEED: Product/Domain Knowledge**
What About Brazil?
The Brazilian Software Industry

Sales in 2001

<table>
<thead>
<tr>
<th>Category</th>
<th>Billion of USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Software (Products and Services)</td>
<td>7.7</td>
</tr>
<tr>
<td>Software Products (Package, Custom and Embedded)</td>
<td>3.6</td>
</tr>
<tr>
<td>Software Services (Outsourcing, Development, Integration and Consultancy)</td>
<td>4.1</td>
</tr>
</tbody>
</table>

* 1992/2001

CAGR 1991/2001

- GDP (USD)
- IT (USD)
- SW (USD)
## Indicators of Domestic Competitiveness

<table>
<thead>
<tr>
<th></th>
<th>Software</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth 1995-2000 (%)</td>
<td>~300%</td>
<td>11%</td>
</tr>
<tr>
<td>VA / Employee (10^3 R$)</td>
<td>97</td>
<td>26</td>
</tr>
<tr>
<td>Average Salary (10^3 R$/Year)</td>
<td>30</td>
<td>11</td>
</tr>
<tr>
<td>R&amp;D / Sales* (%)</td>
<td>8%</td>
<td>3.8%</td>
</tr>
</tbody>
</table>

*Probably Includes Substantial Costs Associated to Product Development
Understand by Looking at Leading Firms

Patterns of Leading Firms
- Sample of 55
- Represent 20% of Industry
### Nature of the Leading Firms

<table>
<thead>
<tr>
<th>Main Revenue Source</th>
<th>Share of Firms</th>
<th>Business Model</th>
<th>Share of Firms</th>
<th>Share of Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products</td>
<td>58%</td>
<td>Embedded/Component</td>
<td>34%</td>
<td>13%</td>
</tr>
<tr>
<td>Services</td>
<td>42%</td>
<td>Customizable Product</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High Value Services</td>
<td>35%</td>
<td>62%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low Value Services</td>
<td>7%</td>
<td>14%</td>
</tr>
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Sample: 56 Firms
The Promise of the Domestic Market

- The existence of Lead Sectors
  - Banking
  - Telecom
  - e-Government
  - Niche Startups

- Internationalized and Competitive
- Large IT investment - 30% of Brazil Total
- Important Market for Software companies
  - Foreign, Local Large & Small-Specialized
- Test bed for Innovation
The Promise of the Domestic Market

- The existence of Lead Sectors
  - Banking
  - Telecom
  - e-Government
  - Niche Startups

- Mechanisms to discipline competence creation
  - Venture Capital
  - Public ‘knowledgeable’ Capital
The Effects of External Financing

- Definition of a Clear Business Model
  - Preparation of Detailed Business Plans
  - Work with Outside Consultants
  - Positive Impact of both Private and Public VC

- Restructuring of the Management Structure
  - Hiring of Professional Managers
  - Restructuring of Management Responsibilities

- An Example of a Lead Firm: Modulo
  - One of the top 30 Brazilian Firms
  - Got 2 rounds of VC financing from 1997 to 2001
  - From security software development to security component
  - Hired former CEO of American Express Latin America
  - Files Reports according to US GAAP rules
The Curse of the Domestic Market

- Fast Growth of Domestic Demand
- Large Captive Markets - Private and Public
- Jump to Foreign Solutions
- High Interest Rates

- Anti-Specialization Bias
  - Diversified activities for growing regional market
  - Not specialized work for whole country

- Poor Institutions
  - Limited cooperation and no voice for the industry
  - Absence of a structured development policy

- Small National Firms
  - Difficult to compete with foreign firms locally
  - Difficult to compete in international market
Going Abroad

Software Exports

Export Strategy

Delegations Abroad 28%
Internal/MNC Channels 50%
VAR’s 16%
Other 6%

Brazil 1995
Brazil 2000
China 2000
India 2000

Millions of USD
Lessons from Brazilian Observations

- **Alternative paths to the export path**
  - Rely on Lead Client Sectors
  - Develop mechanisms that induce competence structuring

- **Recognize pitfalls created by domestic orientation**
  - Anti-specialization bias
  - Limits to growth...

- **Important Challenges Remain**
  - Have not succeeded the test of internationalization
  - Leaders in vertical segments are entering in higher level segments more populated with large international suppliers

- **But outsourcing upscaling trend should benefit Brazil**
  - Domain knowledge requirements and experience...
BRAZIL: Exploring the International Market

- Secure vertical Service exports (higher level)
- Exploit component & embedded softw. Products
- Stimulate investment of software multinationals
- Strengthen national positions...

ษา NEED: Larger players - integration
ษา NEED: Process certification or reputation
ษา NEED: International marketing/visibility - Flag
ยา NEED: Policy to influence specialization pattern
Policy Mechanisms and Tools for Brazil

**Services Driven Policy**
- Process qualification
- Use purchasing power to generate critical mass
- Export benefits
- Policy to support Multinational investment Brazil

**Product Driven Policy**
- Stimulate Technology Transfer at all levels
- Foster Entrepreneurial Capability
- Support Development Costs
- Generate export and foreign Installation benefits

**Generic Policy**
- Continue support for ‘smart disciplining capital’
- Create incentives for mergers
- Continue education support
- Help to generate ‘national software flag’
- Reduce ‘Brazil Cost’
Thank You!

Support for this research:

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ADBi - India and China