Innovation and Inclusive Growth in Emerging Economies

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Outline

• Innovation and Inclusive Growth in the context of Emerging Economies
• Innovation Challenge I: Capability Development of Local Firms
• Innovation Challenge II: Innovating for Lower Pyramid markets
• Synergy between the two
• Concluding Remarks
Innovation & Inclusive Growth in the Context of Emerging Economies

- Structural problem: Significant population in low-productivity sectors (rural agriculture and urban informal sectors) and have unmet social needs
- Many SMEs competing on low resource-cost and lack scale to invest in innovation capability
- Innovation Challenge I: Developing capability of local firms to catch up (or at least avoid falling behind) technologically in Global Competition
- Innovation Challenge II: Addressing social needs of “lower pyramid” population & speeding Structural Transformation
The Latecomer Catching Up Challenge?

• The “easy” phase of “growth by accumulation” is over; the next phase of “growth by assimilation & innovation” is harder
  – Competitive advantage is shifting from low resource cost to technological capability
  – But technological frontiers are advancing rapidly, and most developing countries are already “late” in entering the technology capability development race; “Adding-Up” problem & “Middle-Income” trap

• However, opportunities do exist to exploit various latecomer advantages, including knowledge spillovers & new disruptive technologies
The Lower Pyramid Challenge?

• The Challenge of a relatively large Lower Pyramid (Bottom of the Pyramid (BOP)+ Lower Middle Pyramid (LMP))
  – Under-served Social Needs
  – Low Affordability/Market Demand for Many Existing Goods & Services

• But also New Market-Fit Innovation Opportunity
  – Potential to Apply New Technologies
  – Under-Exploited Markets that can be unleashed through Technological and Business Model Innovations offering better Market-Fit
  – Local Firms & Entrepreneurs May Have Competitive Advantage due to their local knowledge & connections
## The Lower Pyramid

### The World Economic Pyramid

<table>
<thead>
<tr>
<th>Annual Per Capita Income*</th>
<th>Tiers</th>
<th>Population in Millions</th>
</tr>
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<tbody>
<tr>
<td>More than $20,000</td>
<td>1</td>
<td>75-100</td>
</tr>
<tr>
<td>$1,500-$20,000</td>
<td>2 &amp; 3</td>
<td>1,500-1,750</td>
</tr>
<tr>
<td>Less than $1,500</td>
<td>4</td>
<td>4,000</td>
</tr>
</tbody>
</table>

*Based on purchasing power parity in U.S.

Source: U.N. World Development Reports
Capability Development of Local Firms I: Raising Innovation Capability of Existing SMEs

• Technology Assimilation/R&D Consortia
  – Pooling of Resources among SMEs
  – Coordination through a Public Research Institute
  – Phased Diffusion Strategy
  – Taiwan ITRI as the best example

• “Creative Imitation” Ecosystem built around Open Technology Platform & Modular Production Cluster
  – Integrated cluster of assemblers, component suppliers and designers/product innovators
  – Competing on speed to market and variety built around open technology platform
  – The “Shanzhai” system in Shenzhen as the leading example
Local Capability Development II: Spawning New Innovative Firms

• Building Technology Entrepreneurship Ecosystem
  – Technology Start-Up Incubation Programs
  – Development of Entrepreneurial Financing System (Angel Investment Community & Venture Capital Industry)
  – “Entrepreneurial” University Model to inculcate entrepreneurial mindset, foster technology spin-offs and inclination to start or work in young firms
  – Attracting overseas diasporas & openness to foreign entrepreneurs
  – Israel, Singapore, Chile?

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<tbody>
<tr>
<td>No. of employees in start-ups</td>
<td>152,805</td>
<td>164,886</td>
<td>191,256</td>
<td>241,874</td>
<td>292,324</td>
<td>306,242</td>
<td>1,349,387</td>
</tr>
<tr>
<td>Total no. of employees in Singapore</td>
<td>2,238,100</td>
<td>2,266,700</td>
<td>2,505,800</td>
<td>2,631,900</td>
<td>2,858,100</td>
<td>2,905,900</td>
<td>15,406,500</td>
</tr>
</tbody>
</table>

* Young firms less than 5 years old

Moving Beyond Catching Up: Innovating for Lower Pyramid

• Limitations of the Latecomer “catch-up” strategy
  – Implicit linear view of a “path-following” mode of learning that consider “path Breaking” Innovation as only possible after one has gotten close to the leaders
  – Strategic Framing Bias that focuses on competing with the incumbent leaders in advanced markets or fitting into their global production system as producers and component suppliers; both reinforce the early-mover advantages of the incumbent leaders

• Need to complement with a strategy to exploit Knowledge Spillovers from Advanced Economies to target New Market Opportunities in the Lower Pyramid of Emerging Markets
A Broader Conceptual Framing of Latecomer Innovation Capability Development

- Types of Technological Capability
- Path-Following vs. Path-Breaking Mode of Learning
- Technology as a Vector of Performance Attributes and their Market-Fit
- Technological vs. Business Model Innovation
TECHNOLOGICAL CAPABILITY

• **Types** of Technological Capability
  – Ability to **Use**
  – Ability to **Imitate (Replicate)**
  – Ability to **Innovate**

• **Level vs. Vector of Capability**
  – Every technology has multiple performance attributes
  – Strategic Choice of which performance attributes to prioritize depends on the target market of application
### Path-Following vs. Path-Breaking Learning

<table>
<thead>
<tr>
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<th>Path Following</th>
<th>Path Breaking</th>
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<tbody>
<tr>
<td><strong>Learning to Innovate</strong></td>
<td>Incremental; Continuous; Sustaining; Exploitative</td>
<td>Radical; Discontinuous; Disruptive; Explorative</td>
</tr>
<tr>
<td><strong>Learning to Replicate</strong></td>
<td>Duplicative Imitation</td>
<td>Creative Imitation</td>
</tr>
<tr>
<td><strong>Learning to Use</strong></td>
<td>Imitative Use</td>
<td>Creative Use</td>
</tr>
</tbody>
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Source: Wong, P.K. (Forthcoming)
# Path Following vs. Path Breaking

<table>
<thead>
<tr>
<th></th>
<th>Path-Following</th>
<th>Path-Breaking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technologically Close to Leader</td>
<td>“Overtaking”; Frontier Leapfrogging</td>
<td>Radical Innovation; Frontier Leapfrogging</td>
</tr>
<tr>
<td>Technologically Far Behind Leader</td>
<td>“Catching-Up” Learning; Stage-skipping Leapfrogging</td>
<td>Disruptive Innovation or New Market Niche Creation</td>
</tr>
</tbody>
</table>

Source: Wong, P.K. (Forthcoming)
Technology Attributes and Market Fit

• Every Technology is a vector of performance attributes; technological improvement/innovation is not movement on a line but in a multi-dimensional space

• Different market applications impose different mix of performance attributes of a technology; different target market strategies will thus require different technological learning and innovation trajectories

• In addition to targeting a different bundle of performance attributes, innovation for new market applications often involves adopting a different business model ("business model" innovation)
# Performance Attributes: Ultra-Sound Scanner

<table>
<thead>
<tr>
<th></th>
<th>Conventional Scanner</th>
<th>Portable Scanner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Image Resolution</strong></td>
<td>High</td>
<td>Lower but acceptable</td>
</tr>
<tr>
<td><strong>Range of Problems Diagnosed</strong></td>
<td>Comprehensive</td>
<td>Limited</td>
</tr>
<tr>
<td><strong>Portability</strong></td>
<td>No</td>
<td>High</td>
</tr>
<tr>
<td><strong>Operating Skills Requirements</strong></td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>
Technological Learning Strategy

Perf Attribute A

Performance Attribute A

Tech Frontier T1

Tech Frontier T2

Leader

Latecomer

Strategy 1

Strategy 2

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<table>
<thead>
<tr>
<th>Low Income/Affordability Level</th>
<th>Cost reduction; “Frugal Innovation” for BOP; Small Packaging; Business Model Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space Constraints</td>
<td>Miniaturization</td>
</tr>
<tr>
<td>Remote Location</td>
<td>Portable solution</td>
</tr>
<tr>
<td>Lack of IP Protection</td>
<td>Rapid incremental innovation &amp; product proliferation; new delivery mechanism</td>
</tr>
<tr>
<td>Poor physical infrastructure</td>
<td>“Juggad” Innovation; mobile solutions</td>
</tr>
</tbody>
</table>
# Path Breaking: Technology vs. Market-Fit

<table>
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<tr>
<th></th>
<th>Existing Market/Application</th>
<th>New Market/Application</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New Technology</strong></td>
<td>Disruptive Innovation</td>
<td>Architectural Innovation</td>
</tr>
<tr>
<td><strong>Existing Technology</strong></td>
<td>Path-Following Innovation</td>
<td>Creative Use</td>
</tr>
</tbody>
</table>

Source: Wong, P.K. (Forthcoming)
Some Examples of Emerging Market Innovations

• Mohd Yunus’ Grameen Bank micro-finance innovation (“bank for the poor”)
• Mobile App Innovations for BOP markets (e.g. MPESA in Kenya, SMS payment in Philippines)
• How China became the world’s leader in Electric Bicycle (“E-Bike”) Industry
• How Singapore became the world’s leader in off-shore oil rig building
• How Taiwanese MTK became the leading platform for “Shanzhai” phones in China
Innovating for Lower Pyramid

• Exploit new technologies, especially ICT, to solve social problems largely ignored by leading firms from advanced countries

• Develop new innovation capabilities by focusing on developing technological attributes that have better market fit with the lower pyramid’s demand characteristics
  – Frugal Innovation for BOP; “Jugaad” Innovation
  – New Business Model

• “Reverse Innovation” and “Horizontal Innovation” growth opportunities

• Re-Prioritize Public R&D to focus on Lower Pyramid

• Promotion of Social Entrepreneurship & New Impact Investing Model to complement traditional public subsidies & philanthropy/ODA models

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Mobile Innovation for Lower Pyramid

• The emerging Open Technology Platform for Mobile Solutions
  – “dumb” sensors
  – “smart” mobile computing/display device
  – wireless data connectivity
  – “cloud storage” & big data analytics

• Disrupts conventional integrated systems
  – Significantly reduced design, development, manufacturing & maintenance cost by using standard modular components and interfaces
  – Greater market-fit to Lower Pyramid environment (low affordability, need for portability, poor maintenance infrastructure, etc)

• Lowers entry barriers for new firms and SMEs
Synergy between Innovating for Lower Pyramid and Capability Development of Local Firms

Exploiting New Disruptive Technologies

“Market-Fit” Innovation

Public R&D for Social Impact

Innovating for Lower Pyramid

New Social Entrepreneurial Business Models & “Impact Investment Fund”

Export to Advanced Economies (“Reverse Innovation”) & other Emerging Economies

Capability Development of Local Firm

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Concluding Observations

- Emerging economies need to pursue both path-following technological learning as well as path-breaking capability development (creative use and creative imitation), even when they are far behind the technological frontiers.

- Innovating for Lower Pyramid market opportunities in the emerging markets themselves contributes not only to bring inclusive development to low-income population, but also contributes to the capability development of local firms.
Thank You !