Driving Innovation in China: A Venture Capital Perspective

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Qiming Venture Partners
Context for Today’s Discussion

Economic Drivers: Public Vs Private Enterprise
- 80% of all employment in Private Enterprises, 107% of all Growth

- Direct capital investment was 107% of Growth in 2009; Human Capital grew 16%; Productivity has declined 30%

- 75% of Industrial Value Add – Private; 75% of which in the last 20 years came from new companies

Structural Reform vs Innovation – only choices for China; Painful tradeoffs in Structural Reform (SOE – NPLs)

IN/OUT/UP/DOWN – Choices for Chinese Govt/Enterprises

Explosion of Venture Capital
Definitions

Invention: Unique Product or Technology

Innovation: Can be Unique (10% in China) or Adaptive (90%) in China
  Inspiration, Technology Constraints, Brilliant Few

Commercialization: Mass Market Adoption
  Scale, Financial/Operating Constraints, Competent Many

Clearly Inter-linked: U.S. and China are the only two markets in the
  world with potential to be equally adept at all three
  Capital, Market Need, Talented People
### Four Sources of Innovation for China

#### Innovation patterns

**Science-based**
- Human capital: Large pool of R&D personnel but quality can improve; better incentives needed to promote high quality research.

**Engineering-based**
- Engineering curriculums, underemphasize learning-by-doing and “art” of engineering.

**Customer-driven**
- Gaps in “soft enablers” for entrepreneurship (e.g., creativity, risk-taking, perceived capabilities).

**Efficiency-based**
- Large population of skilled workers.

#### National innovation system

<table>
<thead>
<tr>
<th>Innovation patterns</th>
<th>1 Human capital</th>
<th>2 Financial capital</th>
<th>3 Infrastructure</th>
<th>4 Policy &amp; Business environment</th>
<th>5 Local demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science-based</td>
<td>Large pool of R&amp;D personnel but quality can improve; better incentives needed to promote high quality research.</td>
<td>Inefficiencies exist in process to allocate public funding for R&amp;D</td>
<td>Quality of life in top Chinese innovation hubs lag global peers (e.g., pollution, education, healthcare)</td>
<td>IP regulations are in place but lack enforcement; Limited collaboration among R&amp;D institutions</td>
<td>Moderate domestic demand for high-priced science-based products (e.g., pharma, biotech)</td>
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<td>Quality of life in top Chinese innovation hubs lag global peers (e.g., pollution, education, healthcare)</td>
<td>Government intervention in “strategic” industries limits competition and incentives to innovate</td>
<td>Government procurement supports scaling of selected products (e.g., telecom equipment)</td>
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<td>Customer-driven</td>
<td>Gaps in “soft enablers” for entrepreneurship (e.g., creativity, risk-taking, perceived capabilities)</td>
<td>Under-developed capital markets</td>
<td>Strong investment in connectivity infrastructure; level of top innovation hubs similar to developed markets</td>
<td>Lack of effective startup incubators; Regulatory whitespace drives commercialization</td>
<td>Large domestic market across product/service categories; Chinese consumers with less brand loyalty</td>
</tr>
<tr>
<td>Efficiency-based</td>
<td>Large population of skilled workers</td>
<td>Significant debt financing available for capex investments for large companies</td>
<td>Strong transportation logistics and utilities in manufacturing hubs</td>
<td>Robust value chain clusters of geographic proximity (e.g., wind, solar)</td>
<td>Government procurement provides “demand” pull for products</td>
</tr>
</tbody>
</table>

**SOURCE:** Team analysis

McKinsey & Company
Four Sources of Innovation for China

**SCIENCE-BASED**
Companies generate solutions and new product/process innovations through basic research

- R&D ecosystem
- Universities
- Public research institution
- Private research institutions

**Firm internal R&D**

- Collaboration
- Invention
- Breakthrough solutions
- Next generation technologies

**ENGINEERING-BASED**
Innovators develop commercial product by designing platform and integrating technology from network of suppliers

- Suppliers
- Product specifications
- Design & engineering teams
- Technology solutions
- Technology Partners

- Latest components
- Requirements

**CUSTOMER-DRIVEN**
Innovators develop new products and business models through engaging with users to understand market needs, preferences and underserved segments; crowdsourcing of technology

- Pain points
- Unmet needs
- Rapid iteration

- New business model
- New products/services

**EFFICIENCY-FOCUSED**
Innovators drive process innovation by maximizing scale economies, lean design approaches, and localization. Technology improvements are sourced from suppliers or internal production teams.

- Additional volume
- Cost reduction

- Quality improvement
- Accumulation of know-how

- Improved efficiency: cost, speed, agility

**SOURCE:** Team analysis

McKinsey & Company
## China’s Emerging Innovation Strengths

### Potential future innovative areas in China

**Building on existing strength**
- Mobile internet (O2O, connectivity-enabled BMs)
- Next Generation Operation (e.g., semi-automated manuf, fast supply chain)

**Urgency (Must-solve problems for sustainable growth)**
- Environmental sustainability (e.g., pollution, water deficit, food scarcity)
- New healthcare delivery models
- Urban complexities management (e.g., space and transportation optimization)
- Education

**Areas with “market creation” opportunities (e.g., substantial funding, gov’t mandate)**
- Biotech/Genomics
- New energy vehicles
- New materials
- Big data/analytics/cloud

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**SOURCE:** McKinsey Global Institute analysis

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McKinsey & Company
China Excels - Speed of Improvement

Incremental Improvement

Innovation Zone

Value

Invention
Results to Date

Patents by Chinese Firms:
- Innovation Patents from 8% to 20%
- Resource Allocation Issue – SOEs are 1/3 as efficient as Private Companies in Patents/Unit of Investment

Companies Breaking Out in Technical Areas:
- Huawei – telecom, handsets
- XiaoMi – consumer electronics
- Face++, Iflytech – facial, voice recognition
- NextEV, Faraday Future, Future Mobility, CATL – EV, batteries
- Royole – now thinnest flexible displays
- iCarbonX – =genomics
- Venus MedTech – heart valves
- UBTech, Pangolin, DJI – robotics, drones

Many examples in Customer-focused Innovation:
- Mobike, Musical.ly, Apus, MeiTu, Oppo, LePur Yogurt, and so on
Invention/Innovation in China Today

5 years at Qiming we have seen increasing number of companies that represent real Invention but still rare; Innovation abundant

But does it really matter????

What is holding back Invention, Innovation?

Too much opportunity in China! Easier to copy or replicate what others are already doing. Proverbial “Low Hanging Fruit”

Innovation thus far largely limited to business models and localization, not fundamental technology breakthroughs; Invention emerging

But it is a very dangerous game to assume that Innovation won’t happen in China
Chinese Innovation MegaProjects

Core Electronic Components, CPUs, Software, Large-scale integrated circuit manufacturing, advanced stepper technology

Broadband wireless hardware and software, proprietary communication protocols

Robotics, CNC machine tools, Aerospace manufacturing, Advanced nuclear reactor technologies

Domestic drug development, Traditional Chinese Medicines, Major chronic diseases (diabetes, AIDS, hepatitis, Genetically Modified Organisms, gene modification technologies

Large scale oil and gas exploration, spaceflight, large scale water treatment and desalination

Remember – This is not just about competition in US or China – its about competition in the World’s Developing Markets

China’s Innovation Opportunity

- Invention
- Innovation
- Commercialization

% of Value

China’s Opportunity

Mass Market

Niche Market

Demand
Venture Capital Led Innovation in China
VC-backed Innovation in China

Venture Capital firms have backed many innovative Chinese companies in the last 15 years.

Internet “Localization – the local company wins every time!”

<table>
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<tr>
<th>World Leader</th>
<th>Chinese Leader</th>
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</thead>
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<tr>
<td>Ebay</td>
<td>Taobao (On line auction)</td>
</tr>
<tr>
<td>Yahoo</td>
<td>Sina (Portal)</td>
</tr>
<tr>
<td>Amazon</td>
<td>Alibaba (Ecommerce)</td>
</tr>
<tr>
<td>Google</td>
<td>Baidu/Qihoo (Search)</td>
</tr>
<tr>
<td>Facebook</td>
<td>WeChat/Tencent</td>
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<tr>
<td>EHarmony</td>
<td>Jiayuan (On line matchmaking)</td>
</tr>
<tr>
<td>Apple</td>
<td>Huawei, Oppo, XiaoMi (Consumer Electronics)</td>
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Unique Chinese Business Model – Unlocking Value in Chinese Market

- Tencent – QQ/SMS, Casual Games
- Focus Media – Outdoor Advertising
- Shanda/Perfect World/NetEase (On Line Gaming)

Internet China now going to ROW – China Leadership to World Leadership? (???)

- Alibaba, Tencent, Baidu, Jingdong, XiaoMi Market caps over $30B USD; Ali and Tencent over $150B USD

The size and growth of China’s domestic market is an extraordinary strategic advantage for China, past and future.

VC has grown from $1B of investment in 2004 in China to $35B in 2016
VC-backed Innovation in China (2)

Healthcare

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<tr>
<td>GE/Siemens</td>
<td>Mindray, United Imaging, Alltech (Imaging)</td>
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<tr>
<td>Quintiles</td>
<td>Tigermed, Crown Bio (Clinical Research)</td>
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<tr>
<td>Medtronic</td>
<td>Venus, Wego (Medical Devices)</td>
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Telecoms

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<tr>
<td>Cisco</td>
<td>Huawei (Equipment)</td>
</tr>
<tr>
<td>Apple</td>
<td>Xiaomi, Oppo (Handsets)</td>
</tr>
<tr>
<td>Qualcomm</td>
<td>Spreadtrum (TDSCDMA), Tsinghua</td>
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Cleantech

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<th>Chinese Leader</th>
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<tr>
<td>Chinese</td>
<td>Suntech, LDK, JASolar (Solar Equipment)</td>
</tr>
<tr>
<td>Chinese</td>
<td>Goldwind (Wind Power)</td>
</tr>
<tr>
<td>Alstom/GE</td>
<td>Shanghai Electric (Large scale turbines)</td>
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Successful Themes Thus Far

- **Localization: Understanding China Better** – Internet companies
- **World Class Product at China Price** – Imaging, Telecoms
- **Truly Unique in China** – On line gaming
- **Critical Mass in China** – SMS, Telecoms
Ultimate Inhibitor to Invention, Innovation

China is excellent at well defined products and services, but lacks a broad capability for large scale integration of hardware and software.

It has talented people and state of the art hardware, but has not dealt with key issues in education and research;

This is not a “quick fix” – but

China Product + Integration + Local Services = Success

How to deal with the Trust Deficit
Q&A