China’s National Strategy and Industrial Development Transformation: In the Perspective of Indigenous Innovation

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Main Contents
I. General description of national innovation related strategies in terms of two key words: “endogenous innovation” and “harmonious society”.
II. Why national innovation related strategies come out? Transformation of industrial growth model.
III. How could endogenous innovation driven and harmonious development happen? Knowledge base and innovation system.
IV. The case of electronics industry in China.

Endogenous innovation since early 2006
- The Process of Globalization and the status of China integrated into the global industrial chain; Opportunities and Challenges of the Rapid development of S&T; “Well-off Society” and the requirements of the domestic economy and social development in this new stage of per capita GDP above 1000$.
- Significant deployments about 16 specific projects, 11 developing fields and 68 priorities topics etc., esp. strengthen the institutional reform through establishing the technology innovation system with industry-academia collaboration centered with enterprises.
- Integrated policy system containing establishing innovative country as target, enhancing endogenous innovation capabilities as national strategy and 60 exercisable policies on ten aspects.

Why innovation related strategies come out?
- No.4 largest Economy after America, Japan, German, RMB20.94trillion GDP in 2006 (in 2005 RMB18 trillion), GDP growth rate keeps on over 9.5% percent during the past 26 years. In 2006, it has reached 10.7%.
- According to China’s Custom Statistics, China’s exportation has reached $969billion, and has over $200billion trade surplus. China has become the largest exportation country in many fields like electronics hardware products, wood manufacturing products, shoes, clothes, garments, toy and even pen products etc.
- Some debates from outside China
- What we have realized inside China?
Researches on Economy growth models in China

- Development model under Comparative advantages strategies (LIN Yifa, 1994, 2002)
- Low price industrialization development model (China Economy growth frontiers Research Group, 2003)
- Over industrialization (ZHANG Jun, 2002)
- Low cost competition development model (LIU Shijian, 2005)
- Old style industrialization road (Wu Jinglian, 2006)
- China is on the stage of transformation of the growth model, but still on the learning by doing stage (learning by investment). (China Economy Growth and Macro economy Stability Research Group, 2006).

- Conclusions in common: China’s economy needs to be transformed, and is on the stage of transformation to innovation driven and harmonious development.

Basic characteristics of China’s industrial growth

- Generic or Specific conditions of industrialization and economy growth?
- Latecomer advantages and industrial opportunities like learning through opening economy. For instance, concerning with the development of high technology, in 2005, 19.8% of high technology industry has reached RMB1.47trillion, which contributed to 13.5% of the growth of manufacturing industry. The growth rate of high technology industrial production value was 13.13% in 2005, which is higher than the growth rate of the manufacturing industrial level. Still in 2005, value added of high technology industry has broken through RMB1000billion. At the same time, the number of high level industries, computer and office equipment manufacturing industry has the highest growth rate.
- Multilayer market and low cost labors
- Huge population in rural area
- Economy institutional transformation
- Weak original innovation, strong imitation (on the stage from imitation to innovation)

Difficulties of China’s sustainable industrial economy growth

- Resources and energy: From 1990 to 2003, energy consuming in China keeps on 4.2 growth rate. China has become the NO.2 energy consuming country. By 2010, energy demands will reach 2.6~2.7billlion standard coal. China imports petroleum, natural gas, iron and many categories of ores. China has become the biggest iron importing country in the world (Jinbei, 2005).
- Cost of environment: The percentage of water and earth loss is 37% of the total lands, the air quality of more than one third large and medium cities is below 3 level, acid rain Regions occupy about 40% of the country, the loss caused by environmental pollution has reached to 3~5% of GDP.
- Income inequality: according to the report from the National Bureau of Statistics, the income on average year of richest 10% people is 10 times of that of poorest 10% people. Those richest 10% people own 45% of the national wealth, but the poorest 10% people own only 1.4% of the national wealth.

How could endogenous innovation driven and harmonious development happen?

- Basis of industrial growth transformation: Enhance the industrial innovation system on macro level
- Knowledge base

How could endogenous innovation driven and harmonious development happen?

- Basis of industrial growth transformation: Enhance the industrial innovation system on macro level

Knowledge base

<table>
<thead>
<tr>
<th>Indicators</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D/Falling</td>
<td>100billion</td>
<td>2146.7</td>
<td>2100.4</td>
<td>2015</td>
<td>3488.1</td>
<td>4523.3</td>
</tr>
<tr>
<td>R&amp;D expenditure</td>
<td>100billion</td>
<td>209.2</td>
<td>212.2</td>
<td>207.5</td>
<td>312.6</td>
<td>480.4</td>
</tr>
<tr>
<td>R&amp;D expenditure/GDP</td>
<td>%</td>
<td>2.07</td>
<td>2.11</td>
<td>2.22</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Government/Final in S&amp;T</td>
<td>100billion</td>
<td>573.6</td>
<td>783.1</td>
<td>848.4</td>
<td>1407.2</td>
<td>1384.0</td>
</tr>
<tr>
<td>Central government</td>
<td>100billion</td>
<td>347.0</td>
<td>444.5</td>
<td>516.2</td>
<td>812.4</td>
<td>817.6</td>
</tr>
<tr>
<td>Local government</td>
<td>100billion</td>
<td>226.6</td>
<td>330.6</td>
<td>335.6</td>
<td>594.8</td>
<td>567.8</td>
</tr>
<tr>
<td>S&amp;T expenditure/final expenditure</td>
<td>%</td>
<td>3.6</td>
<td>3.7</td>
<td>3.7</td>
<td>3.9</td>
<td>3.9</td>
</tr>
<tr>
<td>S&amp;T personnel</td>
<td>100million</td>
<td>332.1</td>
<td>314.1</td>
<td>322.1</td>
<td>328.4</td>
<td>346.2</td>
</tr>
<tr>
<td>R&amp;D scientists and engineers</td>
<td>100million</td>
<td>224.38</td>
<td>227.13</td>
<td>250.47</td>
<td>259.2</td>
<td>296.98</td>
</tr>
</tbody>
</table>

Actors and innovation system

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Universities</th>
<th>Research institutions</th>
<th>LMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers</td>
<td>1792</td>
<td>3901</td>
<td>2876</td>
</tr>
<tr>
<td>R&amp;D personnel 10 thousand</td>
<td>22.7</td>
<td>21.5</td>
<td>20.8</td>
</tr>
<tr>
<td>R&amp;D scientists and engineers</td>
<td>22.2</td>
<td>16.47</td>
<td>17.31</td>
</tr>
<tr>
<td>S&amp;T funding</td>
<td>46.09</td>
<td>95.04</td>
<td>236.58</td>
</tr>
<tr>
<td>S&amp;T expenditure</td>
<td>38.75</td>
<td>82.97</td>
<td>214.13</td>
</tr>
<tr>
<td>R&amp;D expenditure</td>
<td>24.23</td>
<td>51.11</td>
<td>125.03</td>
</tr>
</tbody>
</table>
In 2005, patents applications have grown rapidly. Among the total patents application, there are 93 thousand items on invention patents, 138 thousand on application newly type and 152 thousand on design. Since 2003, the volume of invention application from foreigners has become higher than domestic.

**Patent applications filed and patents granted by SIPO**

- High rapid growth of electronics industry and its global impacts
  - According to OECD, China has become the largest exportation country in terms of ICT products including PC, cell phones, DVD and Video cameras etc. In 2004, the exportation of ICT products in China has reached $180 billion.

**The Case of electronics industry in China: transformation to innovation driven model**

- Challenges for transformation
  - Presently, impacts of globalization: game rules deciding the international trade conditions change, new entry barriers, esp. technology barriers and IPRs issues.
  - Tough competition: much rapid speed of coming out fully new technologies, new products and decreasing speed of price after coming out of new products

**The Price Dynamics of Notebook PC**

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (Ten thousand items)</th>
<th>Sales (RMB billion)</th>
<th>Sales (Ten thousand items)</th>
<th>Average Price (RMB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3.0</td>
<td>9.0</td>
<td>3.0</td>
<td>31,675</td>
</tr>
<tr>
<td>2001</td>
<td>8.0</td>
<td>13.0</td>
<td>8.0</td>
<td>16,545</td>
</tr>
<tr>
<td>2002</td>
<td>12.0</td>
<td>17.0</td>
<td>12.0</td>
<td>13,738</td>
</tr>
<tr>
<td>2003</td>
<td>18.0</td>
<td>25.0</td>
<td>18.0</td>
<td>12,552</td>
</tr>
<tr>
<td>2004</td>
<td>28.0</td>
<td>33.0</td>
<td>28.0</td>
<td>12,552</td>
</tr>
</tbody>
</table>
Basic conditions of industrial transformation

- Large scale returns could reduce the R&D cost through proportion.
- Upgrading investment capabilities, multinational corporations and international R&D move into China.
- Internal and external market provide huge spaces for reorganizing the resources and constituents.
- Overall well organized industrial system has formed, such as 5 manufacturing industrial clusters, which will be much helpful for the labor intensive, technological and organizational innovation.

Innovation activities and learning capabilities

- Funding and Expenditures on science and technology by large and medium enterprises.
- Structure Expenditure on science and technology: internal learning with R&D efforts or entrust external learning through enterprises partnerships or industrial academia.

Innovation output and efficiency

- Patents
- New products
Strategic dynamics
- Step by step strategy by enterprises, Basically what kind of innovation they do? Both China and India, incremental innovation?
- National strategy evolution (technology leverage, for instance, science and technology programmes or projects)
- Late innovation strategy on meso level

Constraining factors
- Lack of Core technology
- The status on the global industrial value chain, upgrading? (if we see the profitability)
- rely on FDI (Different between India and China)

Contributions of FDI

<table>
<thead>
<tr>
<th>Year</th>
<th>FDI</th>
<th>State-owned</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>3.35</td>
<td>73.89</td>
<td>22.76</td>
</tr>
<tr>
<td>1990</td>
<td>10.09</td>
<td>48.79</td>
<td>26.11</td>
</tr>
<tr>
<td>1995</td>
<td>37.48</td>
<td>40.10</td>
<td>22.41</td>
</tr>
<tr>
<td>2000</td>
<td>46.85</td>
<td>25.91</td>
<td>27.24</td>
</tr>
<tr>
<td>2001</td>
<td>54.70</td>
<td>21.08</td>
<td>24.22</td>
</tr>
<tr>
<td>2002</td>
<td>67.79</td>
<td>10.15</td>
<td>26.02</td>
</tr>
<tr>
<td>2003</td>
<td>69.68</td>
<td>10.62</td>
<td>18.32</td>
</tr>
</tbody>
</table>

Calculated according to the data from China’s Electronics Industry Yearbook.

Comparisons between FDI and State-owned Firms on technology capabilities and innovation outputs

<table>
<thead>
<tr>
<th>Type</th>
<th>1999</th>
<th>2001</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of firms</td>
<td>3.35</td>
<td>10.09</td>
<td>22.76</td>
</tr>
<tr>
<td>Technological development (expansion)</td>
<td>3.35</td>
<td>10.09</td>
<td>22.76</td>
</tr>
<tr>
<td>Research and development</td>
<td>3.35</td>
<td>10.09</td>
<td>22.76</td>
</tr>
<tr>
<td>S&amp;T funding</td>
<td>2.24</td>
<td>3.69</td>
<td>15.55</td>
</tr>
<tr>
<td>S&amp;T intra-expenditure</td>
<td>1.72</td>
<td>2.48</td>
<td>14.50</td>
</tr>
<tr>
<td>New products development expenditure</td>
<td>2.03</td>
<td>7.65</td>
<td>15.94</td>
</tr>
<tr>
<td>Technology alteration expenditure</td>
<td>0.47</td>
<td>0.65</td>
<td>8.60</td>
</tr>
<tr>
<td>Technology importation expenditure</td>
<td>9.51</td>
<td>6.63</td>
<td>702.23</td>
</tr>
<tr>
<td>Absorption and assimilation</td>
<td>3.35</td>
<td>7.33</td>
<td>16.35</td>
</tr>
<tr>
<td>Domestic technologies purchasing</td>
<td>0.90</td>
<td>0.81</td>
<td>13.03</td>
</tr>
<tr>
<td>Technology development projects</td>
<td>0.51</td>
<td>0.88</td>
<td>3.66</td>
</tr>
<tr>
<td>New products development projects</td>
<td>0.44</td>
<td>0.85</td>
<td>3.01</td>
</tr>
<tr>
<td>Industrial TPV</td>
<td>2.78</td>
<td>7.29</td>
<td>44.85</td>
</tr>
<tr>
<td>Industrial Sales</td>
<td>2.80</td>
<td>7.30</td>
<td>45.60</td>
</tr>
<tr>
<td>Profits and taxes</td>
<td>5.16</td>
<td>5.24</td>
<td>20.45</td>
</tr>
<tr>
<td>Patents application</td>
<td>0.58</td>
<td>2.85</td>
<td>16.35</td>
</tr>
<tr>
<td>Patents granted</td>
<td>0.73</td>
<td>5.85</td>
<td>66.65</td>
</tr>
</tbody>
</table>

80% JV in China, while 80% national firms in India (why? Still some restrictions for FDI to IT even after WTO)

Exportation structure of ICT products in China %

<table>
<thead>
<tr>
<th>Year</th>
<th>Telecommunication</th>
<th>Consuming electronics</th>
<th>Computers and relevant</th>
<th>Processing trade</th>
<th>General trade</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>14.15</td>
<td>25.84</td>
<td>34.30</td>
<td>90</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>12.6</td>
<td>24</td>
<td>38.9</td>
<td>80</td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>12.2</td>
<td>19.3</td>
<td>46.7</td>
<td>90</td>
<td>6.8</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>14.3</td>
<td>16.14</td>
<td>47.2</td>
<td>80</td>
<td>7.7</td>
<td></td>
</tr>
</tbody>
</table>

Data: China Census.

Implications
- Interactions between national innovation strategies on macro level and firm growth model on micro level bring into diversified industrial growth models, even following the same innovation orientated directions.
- .......

The opinions expressed by the author and do not necessarily reflect the views of the Institution of the Ministry.
Diversity: the Key to Corporate Governance Reform in a Diverse World
---- A Study from a Chinese Perspective

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Part 1

General background of Worldwide Movement for Corporate Governance Reform

World Economic Situation in 1990s

- Three driving forces of world economy in 1990s
  - EU (underway of integration)
  - Japan and “four small dragons” (bubble and financial crisis)
  - US (the only “paradise” left)

Critiques on corporate governance after Asian financial crises

- Main bank system (Japan)
- Government interfering (South Korea)
- Lack of shareholders’ protection (Hong Kong)
- Internal control (SOEs in Mainland China)
- Transparency

Emergence of Corporate Governance Reform

- OECD principles issued in 1999, worldwide corporate governance reform initiated
- Anglo-Saxon Model introduced
  - Protection of investors’ interests
  - Structure of board of directors
  - Information disclosure and transparency
  - Standard accounting system
Latest Development on Corporate Governance Reform

- Consideration of stakeholders’ interests
- Corporate social responsibility (CSR)
- Social responsibility investment (SRI)
- Sustainable development

Part 2
Implementation for Corporate Governance Reform in China

Efforts to merge into global village since 1978

- Economic reform and from which, diversified ownerships applied
  - Result 1: FDI inflow enormously increased
  - Result 2: private sector growing up
  - Result 3: government released the authority to state-owned enterprises

Pressure and motivation

- Process of the accession to WTO and the pressure from WTO
  - China’s commitments to WTO
  - Opening market and privatisation
  - Development of capital market and restructuring of SOEs
  - Shanghai and Shenzhen Stock Exchange restored in 1991
  - Main companies either already in or eager to enter stock market

Initiatives of Corporate Governance Reform

- Corporate governance reform initiating in listed companies since 2001
  - Regulatory administration: China Securities Regulatory Commission (CSRC), under state council
  - CSRC issued China Corporate Governance Code in 2001 to initiate the implementation

Main Content of China CG Code

- Protecting shareholders’ legal rights and benefits
- Strengthening the duty and honesty of board directors
  - There should be at least 2-3 independent directors in the board
  - The board must contained 4 special committees
(Structure of Board in China)

- Board of Directors
  - Audit Committee
  - Nomination Committee
  - Strategy Committee
  - Compensation Committee

Main Content of China CG Code
- Promoting the function of supervisory board
- Creating the system of evaluation, stimulation and restriction
- Concerning stakeholder’s interests
- Strengthening the responsibility of information disclosure and rising corporate transparency

Part 3
Rethinking on Corporate Governance Reform

Events:
- Enron
- Worldcom
- …

Key issues:
- Transparency
- Cheating
- CEO internal control

Results
- Losing of public confidence in firms
- Creating discrepancy amount people
- Causing social conflicts
- Pollution and irreversible damage of the environment
- Inequity to our future generations

Corporate scandals since 2000

Two ends of world
- Small riches
- Increasing poverty
- Enormous fortune
- Enormous population
**How to define properly in term of “firm”?**

- Target: profit
- Function: supplementary to market
- Operating area: market
- Duty: legal activities

**Exaggerated function of corporate governance reform**

- Promoting firm social responsibility
  - Using more resources, producing more products and then,
  - Spending more money on CSR
- Ignoring the cultural differences
  - World tendency for the consensus principles
  - Race, history, tradition, language, nation, …

**Restoring new social value and regulating firm behaviour**

- Rebuilding social confidence by:
  - Less products (environment)
  - Simple life (spirit)
  - Ethic in economic activities (reputation)
- Improving legal environment and its implementation, especially in developing countries

**Part 4 Lessons from China**

**Win-loss game**

- FDI and its impacts in China
  - Investment (Joint ventures), management training, contribution to GDP growth, …
  - Blocking for technology upgrading (no core technology), enlarging the regional developing differences
  - Competitiveness introduction

**Win-loss game**

- Opening domestic market
  - Market creating, developing and completing, comparing with the planning economy
  - Lack of market capacities and result the low products in the market
  - Market development encounters social sustainable development (e.g. pollution)
Win-loss game
- Entering international Market
  - Opportunities
  - Evil competition
  - Conflicts with local players

Search for Chinese own characteristics
- 25 years of high speed growth
- Private sector development
  - Urbanization
  - Employment
  - Contribution to GDP growth
- Rethinking of development path dependency

Conclusions
- World tendency for the convergence of good corporate reform will probably only remain at the stage of codes, if it continuously goes, but not at the practice level.

Conclusions
- Variation and multiple choices for the diversified world where we live are reasonable, and perhaps the only one we could agree with consensus, based with the different background including countries, nations, cultures, traditions, histories, geographies as well as, maybe the most important concerning economic studies, the different stages of developing level.

Some feelings on China-India Comparatives
- Both China and India need badly to be acquainted mutually
  - Experts level
  - General sense
- Different social system, but same problem when facing with high economic growth
  - Bureaucracy
  - Inefficiency
  - Entrance barriers
  - Etc..

Some feelings
- Unemployment
  - Definition, precision and reliance of statistics
- TVEs, Chinese way of solution
- Infrastructure
  - Soft-infrastructure
  - Hard-infrastructure
- Ideal changes