



R&D and Its Social Performance in China

ZENG Guoping

Professor and Director

Center of Science, Technology and Society, Tsinghua University

sts001@tsinghua.edu.cn

<http://rwxy.tsinghua.edu.cn/xi-suo/kjs/STSinTsinghuaENG.htm>

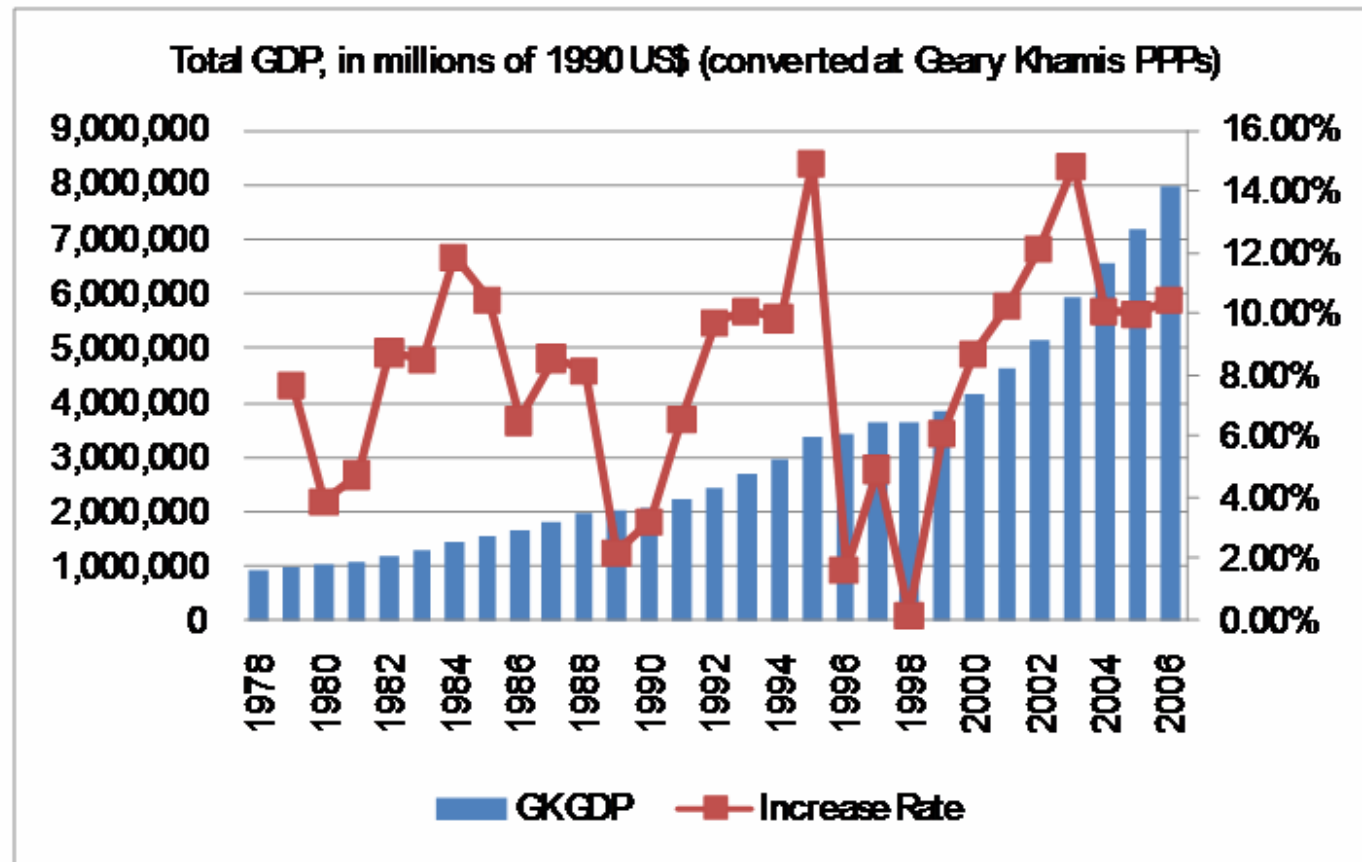


Outline

- ❖ **Background: economy and social changes in catching-up**
- ❖ **R&D status quo and its' new challenge**
- ❖ **China's new innovation strategies**
- ❖ **R&D investment and society**



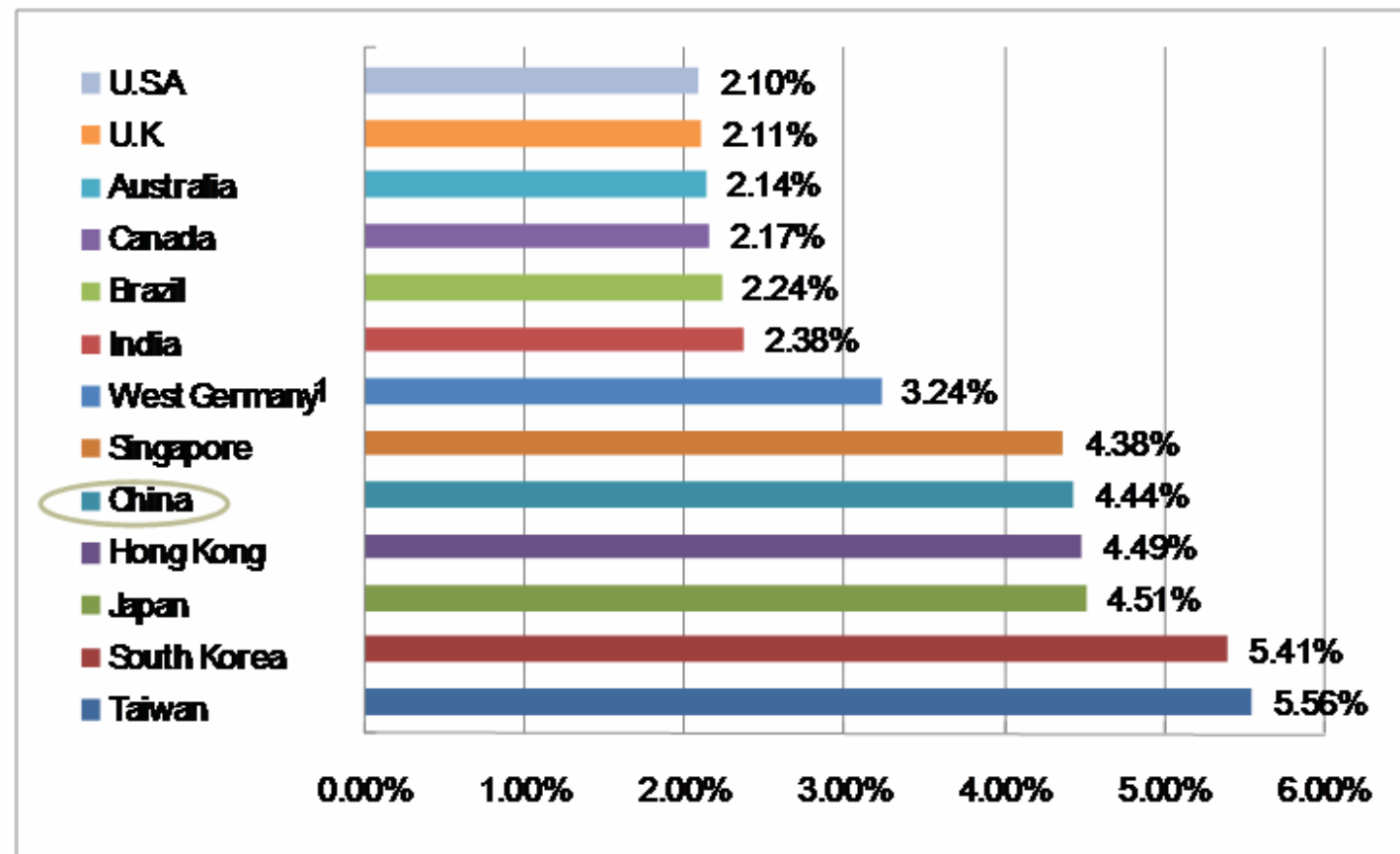
1.1 Economy system



Source: Groningen Growth and Development Centre and the Conference Board, Total Economy Database, January 2007, <http://www.ggdc.net>



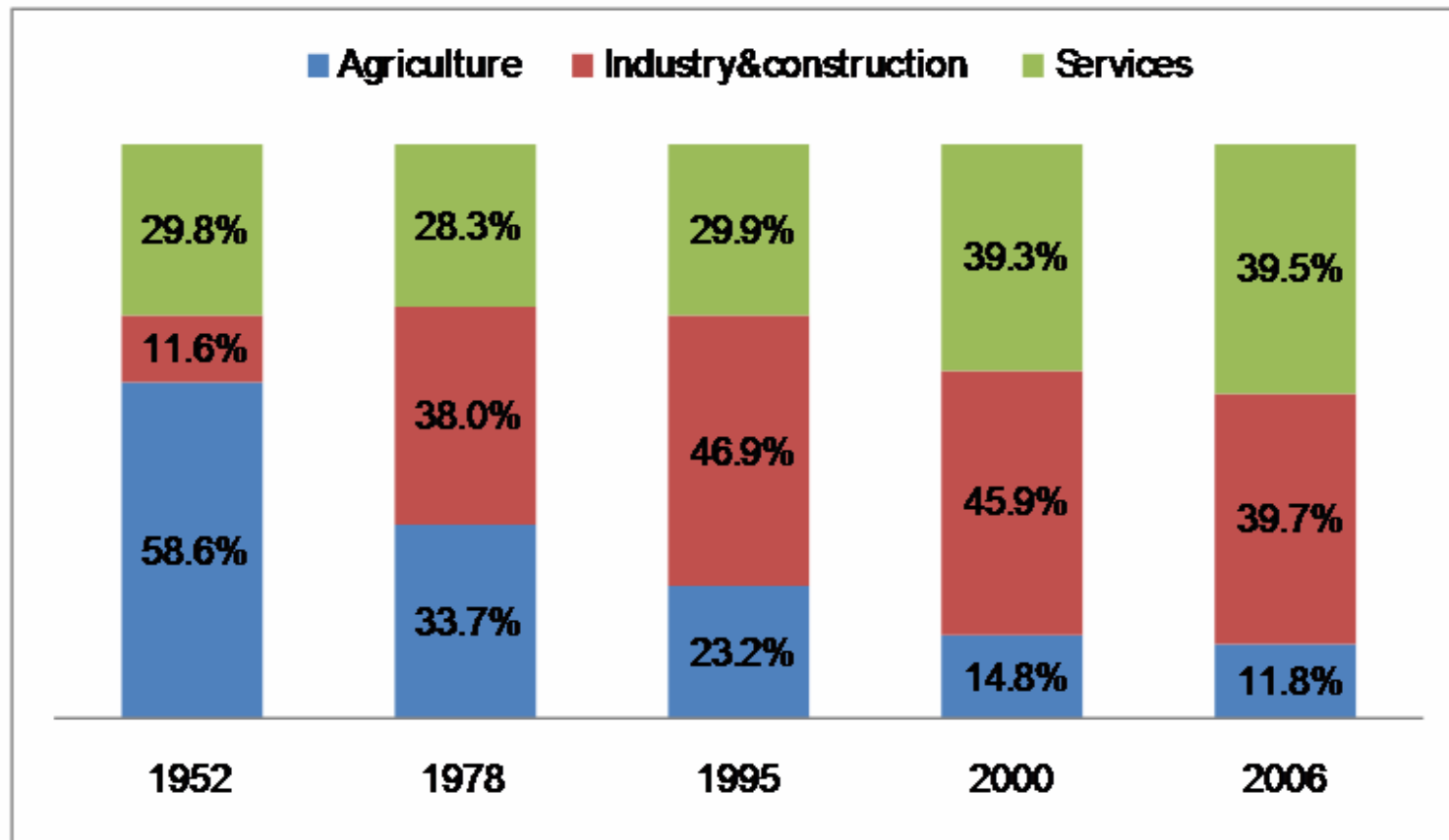
1.2 GDP per Capita Growth:1950-2004



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2006, <http://www.ggdc.net> (in 1990 GK\$)



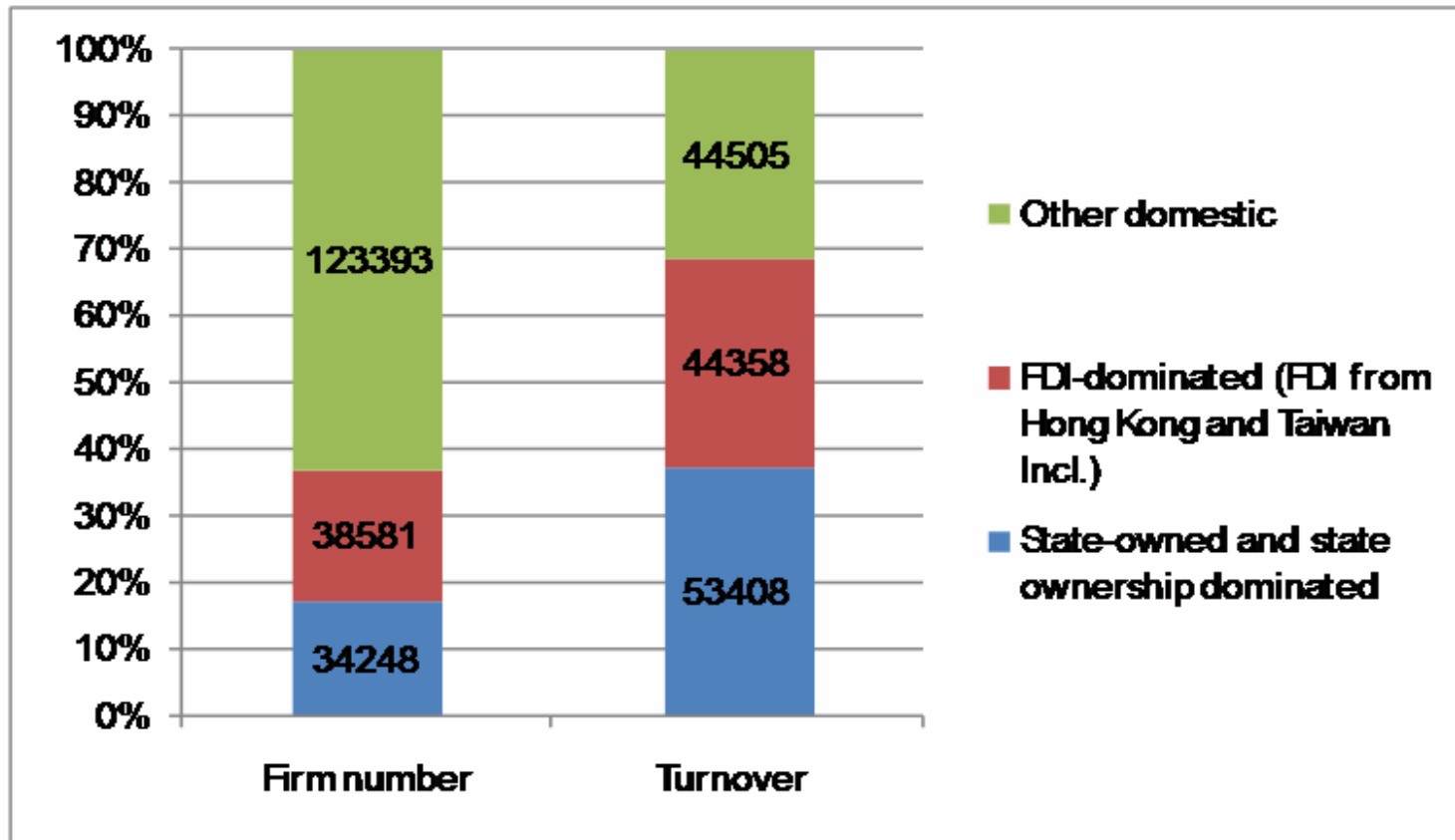
1.3 Industrial structure



Source: Maddison, Angus 1998: Chinese Economic Performance in the Long Run, OECD Paris 1998 (before 2000).



1.4 Industry ownership structure by 2003



Source: based on China statistical yearbook Table 14-2 2004

<http://www.stats.gov.cn/tjsj/ndsj/yb2004-c/indexch.htm>

Note: the calculation is for all the firms which have annual turnover higher than 500 million

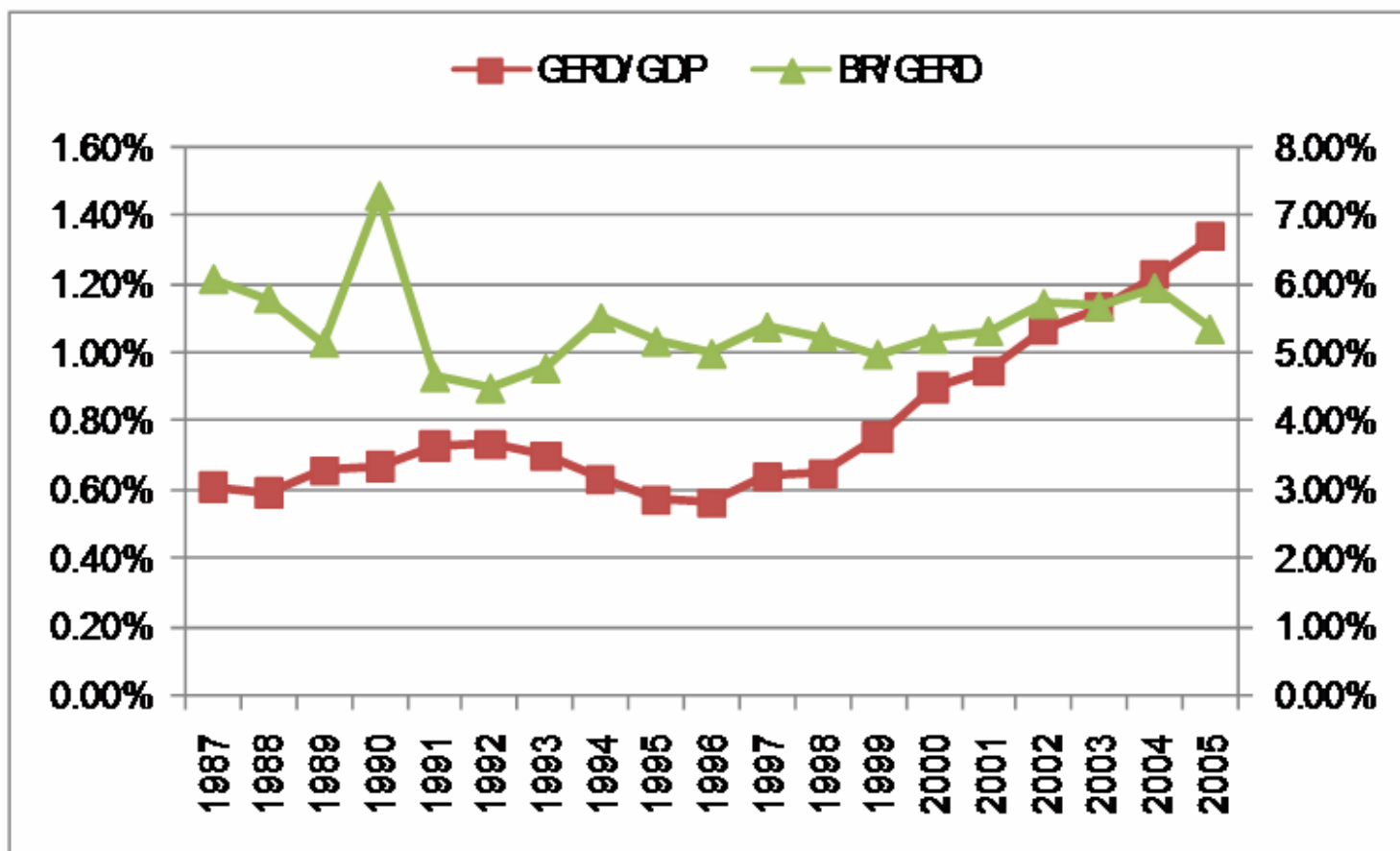


1.5 Other aspects of Chinese society

- ❖ **Apparent: urbanizing, modernizing, and Globalizing...**
 - ❖ **Urban population: 20.6%(1982) → 43.9%(2006);**
 - ❖ **Overseas travel: 8.43 (1998) mil. → 28.85 mil. (2004)**
- ❖ **Institution: constitutionalizing, diversifying...**
 - ❖ **Village election and township election experiments;**
 - ❖ **Administrative and legal systems reforms;**
 - ❖ **Broader public participation in the policy;**
 - ❖ **The growth of non-governmental sector;**
 - ❖ **Anti-corruption campaigns...**
- ❖ **Culture: the conflict and fusion of “Traditional” with “Modern”, “East” with “West”...**



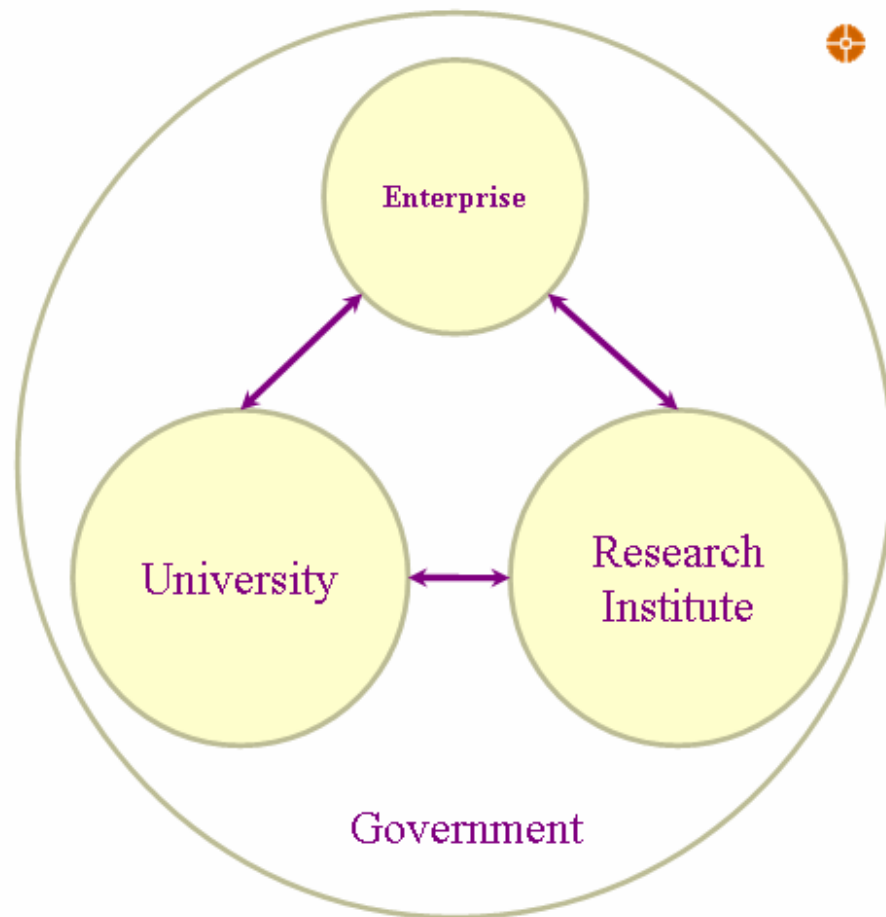
2.1 Low R&D and even low Basic Research



Source: <http://www.sts.org.cn/KJNEW/maintitle/>.



2.2 Different “Triple-helix”: the shadow of planning



✪ Chinese NIS structure:

- ✪ Government : both the executor and supervisor;
- ✪ Research institute: “mi-lu” like;
- ✪ University: important innovation pole but limited social performance;
- ✪ Enterprise: especially weak:
 - BR: 7.3% (2003)
 - AP: 24.3% (2003)
 - S&T Papers: 5.6% (2003) ↓
 - Patent applied: 66%(2000) ↑
- ✪ Regional innovation system is also remarkable in the Pearl and Yangtze River Delta...



2.3 Some attempt to innovate in structure

- ❖ **Pushing public research into market:**
 - ❖ 1050 research institutes were transformed into business since 1999 government reform, by the end of 2003;
 - ❖ 99 others were merged into universities or transformed into NGOs.
- ❖ **Make the universities more “strong”:**
 - ❖ **Gross enrollment: 3.7% (1990) → 21% (2005) and 1.08 Million (1998)→5.40 Million (2006) since 1999 is the first year to expand ;**
 - ❖ **Structural change by consolidation of universities: among them 637 → 270;**
 - ❖ **Decentralization of the management: Universities administrated by Central Ministries reduced from 367 to 120 (including about 70 national universities by Ministry of Education);**
 - ❖ **Strengthening universities’ R&D capability: 985 (involving about 20 Universities) and 211(involving about 100 Universities) program...**



2.4 Industry R&D with Chinese characteristic

- ❖ **Supporting State Owned and other enterprises to establish their of R&D centers:**
 - ❖ About 300 centers certified by the central government;
 - ❖ Over 2000 centers certified by provincial governments;
- ❖ **Helping MNEs to establish R&D centers in China:**
 - ❖ Official figure show that 750 MNEs R&D centers were established in Beijing, Shanghai, Guangzhou, Chengdu etc. by mid-2005;
- ❖ **Guiding small business innovation:**
 - ❖ Small and Medium Enterprise innovation fund...



3.1 Comprehensively Constructing Well-off society

- ❁ **Target of the Well-off society:**
 - ❁ **GDP in 2020 increase 4 times of in 2000**
 - ❁ **GDP per capita reaches to \$3000**
 - ❁ **Increase rate should at least be 7.18%...**
- ❁ **Principle of the scientific outlook on development:**
 - ❁ **People-oriented**
 - ❁ **Comprehensive development**
 - ❁ **Coordinated Development**
 - ❁ **Sustainable development**



3.2 New challenges- within China's NIS

- ❖ **The concordant development of human and nature:**
 - ❖ 2003 consumed 7.4% of world petroleum, 31% coal, 27% steel and 40% cement to get 4% GDP of the world;
 - ❖ About two third of cities lack of water, and 0.36% population in rural area can not have quality water...
- ❖ **Peoples warfare vs. the number of GDP:**
 - ❖ 1.2 million students can't find job when graduated from universities in 2005 which is nearly 2 times than 2003;
 - ❖ ¼ graduated students' salary below 1000 Yuan which is even lower than the rent of house with 20 m² (2006, Beijing)...
- ❖ **Economic and social safety:**
 - ❖ The “Footloose” industry structure in Guangdong and Jiangsu...



3.3 Indigenous innovation is one of the possible outlet

- ❖ **With over 2000 experts' effort in more than two years, China drafted a median and long term S&T plan, which was published in early 2006**
 - ❖ **Objective-making China an innovation-based country in 2020;**
 - Increasing R&D spending to 2.5 percent of GDP;
 - Increasing the contribution of S&T to the economic growth;
 - Reducing over-dependency on foreign technology;
 - Stepping up the output of publications and patents in major fields.
 - ❖ **Approach-promoting indigenous innovation;**
 - Importation, assimilation, and innovation;
 - Integration innovation;
 - Original innovation;



3.4 Focused research areas and programs

- ⊕ **Applied research based on the societal needs:**
 - ⊞ Energy, water resources, environmental protection, health,
 - ⊞ agriculture, manufacturing, service, and etc ;
- ⊕ **Mega Projects:**
 - ⊞ Semiconductor manufacturing, broadband wireless mobile communication, nuclear power, water pollution treatment, power , AIDS and Hepatitis , aircraft manufacturing , space exploration and etc.
- ⊕ **Frontier Technologies:**
 - ⊞ bio-tech, IT, new materials, new energy, space...
- ⊕ **Important basic research**
 - ⊞ In broad areas and interdisciplinary areas.



3.5 Framework conditions

- ⊕ **Institutional Reform and improving the performance of national innovation system**
 - ⊕ *Enterprise-centered tech-innovation system*
- ⊕ **Coordinated policy support**
- ⊕ **Public understanding and innovative culture**
- ⊕ **Investment and infrastructure**
- ⊕ **Human resource development**
- ⊕ **International cooperation**



3.6 Innovation policies (1)

⊕ Government investment:

- ⊗ Encourage multiple channels to invest in R&D**
- ⊗ Government budget would maintain stable growth;**
- ⊗ Government investment in mega-projects and infrastructure;**

⊕ Tax incentives:

- ⊗ R&D spending can be deducted from taxable income on a 150% basis, which is also transferable in five years;**
- ⊗ Accelerated depreciation for R&D instruments and equipment;**
- ⊗ High-tech companies in National High-Tech Zones can enjoy two year tax-free benefits after becoming profitable...**



Innovation policies (2)

✦ Financing R&D

- ✦ Public banks will support national mega-projects;**
- ✦ Banks will support SME innovations;**
- ✦ Policy support for venture capital markets;**
- ✦ Facilitate and reduce barriers for domestic firms to set up R&D centers overseas;**

✦ Importation, assimilation and innovation

- ✦ Better management of importation of technologies;**
- ✦ Establishment of a preferred list of foreign technologies and limitation of importation of old and outdated technologies;**
- ✦ Policy support of importation, assimilation and innovation.**



Innovation policies (3)

- ❖ **Creation and protection of IPRs:**
 - ❖ Support and facilitate firms to gain IPRs in important technology areas;
 - ❖ Support Chinese firms and industrial associations to participate in international technology standard settings;
 - ❖ Improve IPR protection environment; strengthening punishment of IPR violators;
 - ❖ Improve the process for patent examination;
 - ❖ Integrate China's technology trade system with the international system;
- ❖ **S&T human resource development**
- ❖ **S&T Platform**
- ❖ **Overall policy coordination**



4.1 R&D investment: once for all or all for one?

⊕ R&D can not be once for all:

- ❖ It is possible of leapfrog in the technology trajectory but not the technology capability, neither can we buy or borrow it;**
- ❖ The formation of new culture especially the values is much more important but harder than of institution, so need a lot of time...**

⊕ R&D is not the only thing:

- ❖ R&D is only one part of the social economy system;**
- ❖ The linkage between the actors in NIS is even more important than enhancement of the single unit;**
- ❖ Social welfare (people-oriented) is the final target but not the number of R&D investment or even the GDP...**



4.2 The reflection of the logic of R&D

- ❖ **There is no consequent logic between R&D and society:**
 - ❖ Do R&D but not only for doing R&D;
 - ❖ The “best practice” in local context means different things...
- ❖ **Main role R&D plays in the social-economy system:**
 - ❖ Ensure of the sustainable development;
 - ❖ Soil of the talent growth and the innovation capability cultivation;
 - ❖ Inevitable course of innovative culture as a practice...
- ❖ **Keeping weather eye:**
 - ❖ The dilemma of new “Great Leap Forward” movement named after indigenous innovation;
 - ❖ The growth of the new “interest group” and new “God”...



Thank You!