

# Innovation, Challenge and Development: Universities in China

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# Main Content

- Is the current development of China sustainable and why education is important?
- Chinese higher education: historic and current
- Restore the culture
- About Chongqing University

# Rapid development of China

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- Rapid development of China
  - mass-products
    - steel: 626 million tons, almost the half of the total output of the world
    - cement: 1.63 billion tons, 73% of the world
  - export-oriented economy
    - the total value of export and import: 2973 billion USD
    - export: 1578 USD, import: 1395 USD
- Challenges faced
  - energy, resources and environment
  - carbon dioxide emission
    - China: 2.7 billion tons, 4.4 tons per capita
    - US: 2.8 billion tons, 19.58 tons per capita
    - Australia: 226 million tons, 20.58 tons per capita
  - population aging, health and human resources



# Complexity as a large country

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- China becomes the 2nd largest economy
  - GDP in 2010 (USD)
    - US: 14,660 billion, China: 5,879 billion, Japan: 5.459 billion
- Large differences
  - large population
    - 4,709 dollars per capita, ranked No. 95 in the world
  - differences in the east and west part of China (USD per capita)
    - Suzhou: 15,300, Shanghai: 10,500, Beijing: 9,100, Chongqing: 4,000
  - differences in the urban and rural: disposable income (USD per capita)
    - urban: 2,940, rural: 910
  - differences between rich and poor
    - 4.5:1 in 1978
    - 12.7:1 in 2008
  - Gini coefficient : 0.497 in 2009



# How to realize sustainable development?

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- The development of China is not sustainable, unless we could find a new alternative way
- Resource-saving life and developing style
  - an innovative society
    - new science and technology that could support the sustainable development
    - new concept for the sustainable life and society
  - new and well-educated generation that could face the future challenge
- Education is crucial for the sustainable of China

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# Historic view: Ancient Education

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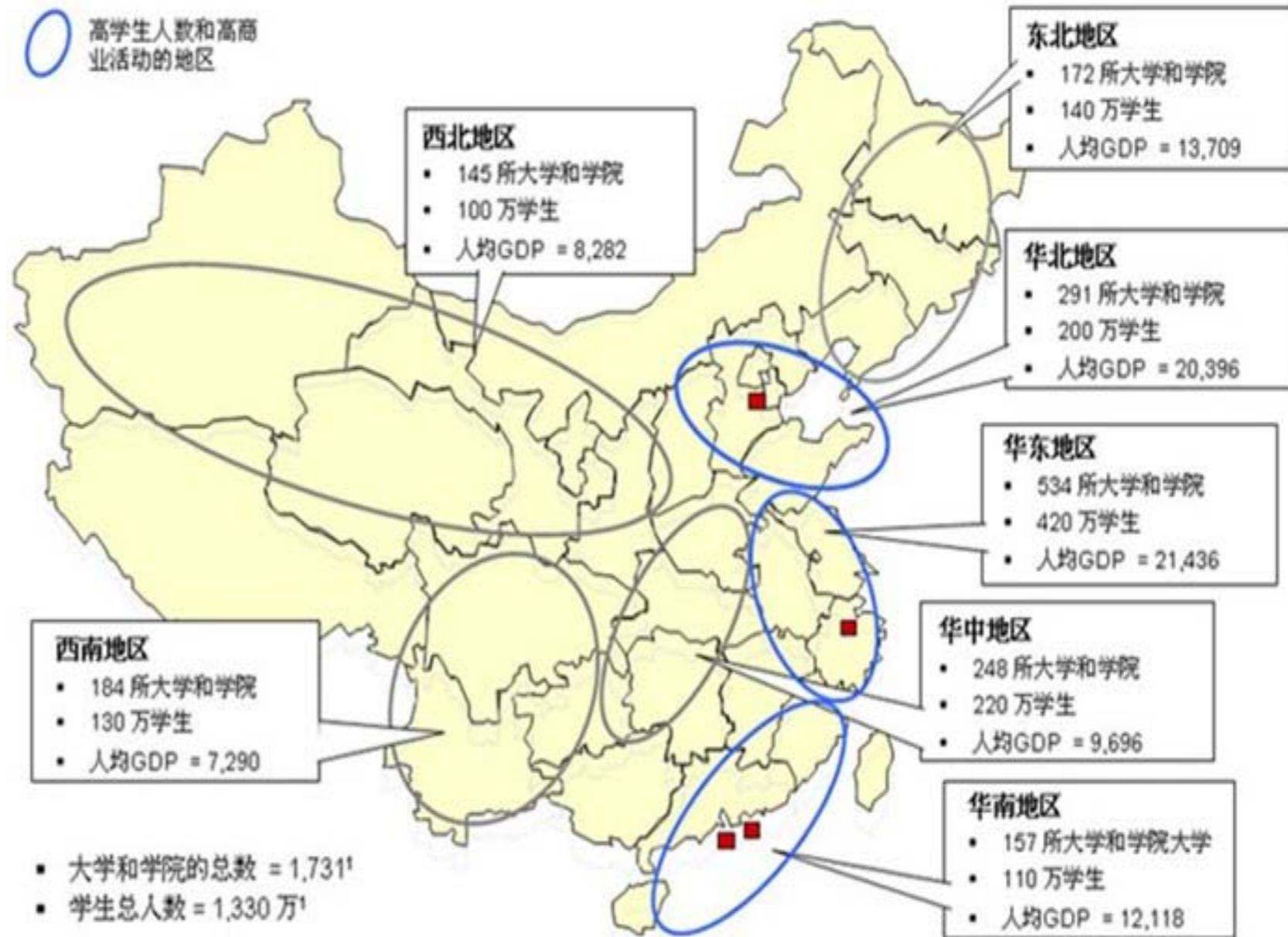
- Traditional Chinese higher education
  - More than 2000 years
  - “私塾”: Private School
  - “书院”: Private college of classical learning
  - “太学”: Imperial college
- Core value of traditional “Great Learning”
  - What the great learning teaches, is to illustrate illustrious virtue; to renovate the people; and to rest in the highest excellence
  - emphasis on rectifying one’s heart, cultivating noble personality
- The values of traditional learning
  - 大学之道在明明德：the main purpose of higher learning is to promote excellence on one’s moral
  - 学而优则仕: officialdom is the natural outlet for good scholars



# Historic tradition of examination

- Examination-oriented education system
  - “科举” imperial examination started in the year of 605 A.D.
    - focusing on explanation of the classical literatures
    - the purpose is being a official, not scientists
  - “高考” national entrance examination
    - focusing on knowledge
    - the purpose is entering universities
  - Common feature
    - follow the principle, not encourage to create any new principles

Large population and high demand for education



资料来源: <sup>1</sup>数据来自于中华人民共和国国家统计局《中国统计年鉴2005》; 2004年数据

# Modern higher education institutions

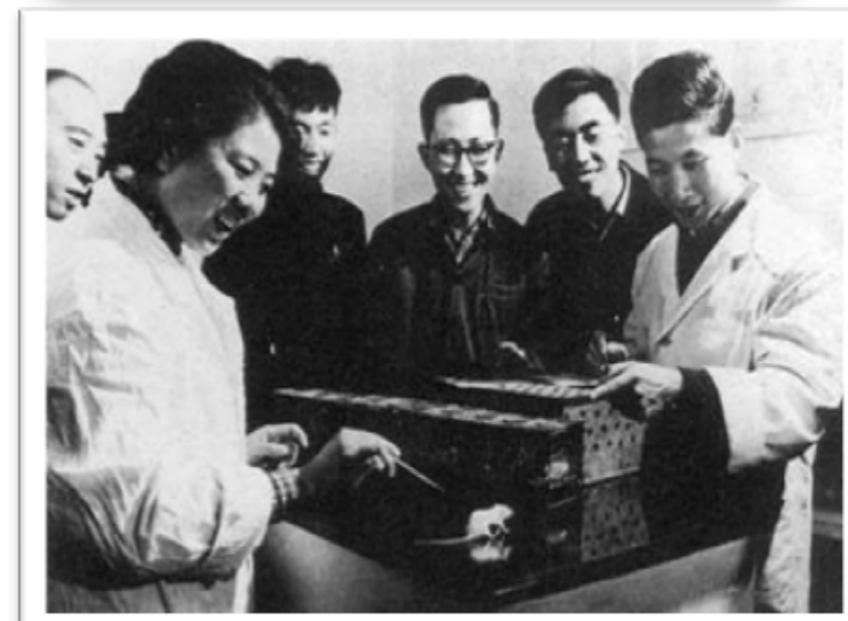
- Missionary colleges
  - Saint John's college founded 1879
  - there were 14 missionary college in 1919
- National colleges
  - imperial Tientsin University, 1895, a technical school
  - imperial University of Peking, 1898, the first national comprehensive university
  - many universities were founded in the beginning of the 20th century
- Chongqing University
  - founded in 1929, the most comprehensive university at the time
  - Schools: humanities and social sciences, natural sciences, engineering, medical, law, business
- The philosophy behind
  - western modern higher education
  - democracy and sciences, a only way to the prosperity of China



# Historic view: Chinese universities

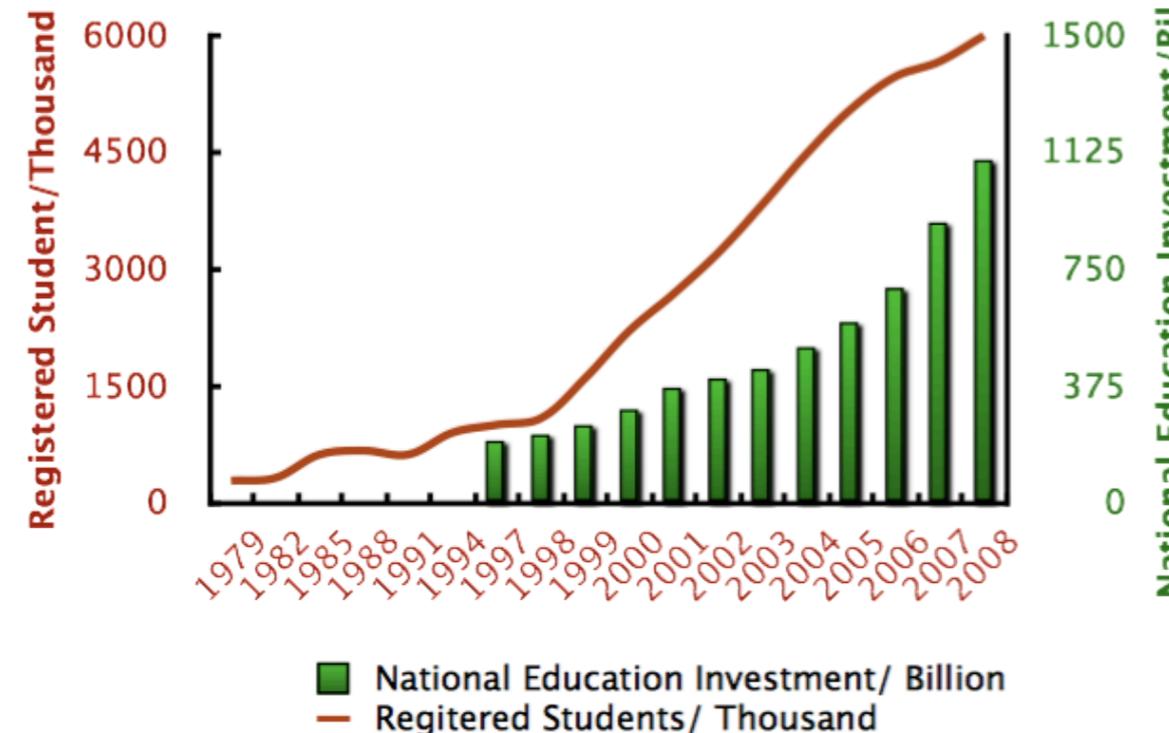
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- Relocation of disciplines in 1952
  - PKU: humanities, social sciences and natural sciences
  - THU: purely technical school
  - CQU
    - Becoming a technical school
    - Departments: mechanical, electric, power, materials and metallurgy, mining
- Single mission: serve to the industrialization of China
  - Higher education institutions become more specialized
- Opening to the rest of world, 1978
  - University merging 1996-2004, to comprehensive universities
    - PKU with Beijing medical U
    - CQU with Chongqing university of built environment
  - Building up top universities in the world



# Expansion of Chinese higher education

- Expansion of student population
  - the gross rate of enrollment increase from 9.8% in 1998, to 26.5% in 2010
  - almost 30 million registered students, the largest in the world
  - the state investment on education had been low during the time
  - the average spending per student decreases dramatically
- Expansion of university campuses
  - building new campuses
  - new recruiting and facilities
- About 300 billion bank loans
  - creating valuable assets for the future



# The perspective

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- Education and R&D investment in 2020
  - R&D spending be 2.5% of GDP
  - education investment will be 4% of GDP (about 36,000 billion 2009)
  - enrollment will be about 36 million, the gross rate of enrollment will be about 40%
- Become an innovative country in 2020
  - the contribution rates of scientific advancement is over 60%
  - dependency on foreign technology is less than 30%
  - authorization of invention patents and citatic scientific publications should be on top 5
  - several top research universities



# Research Universities in China

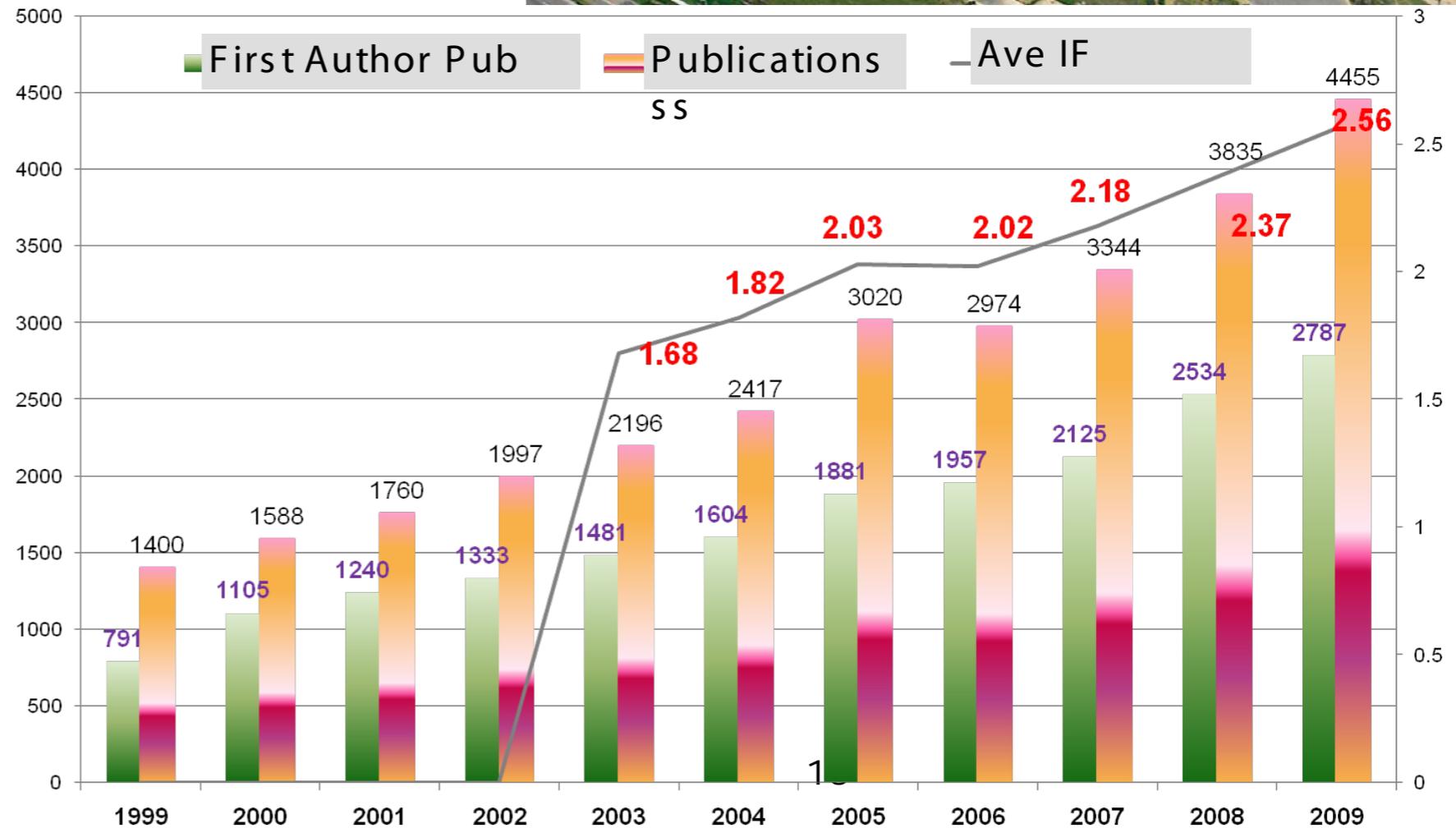
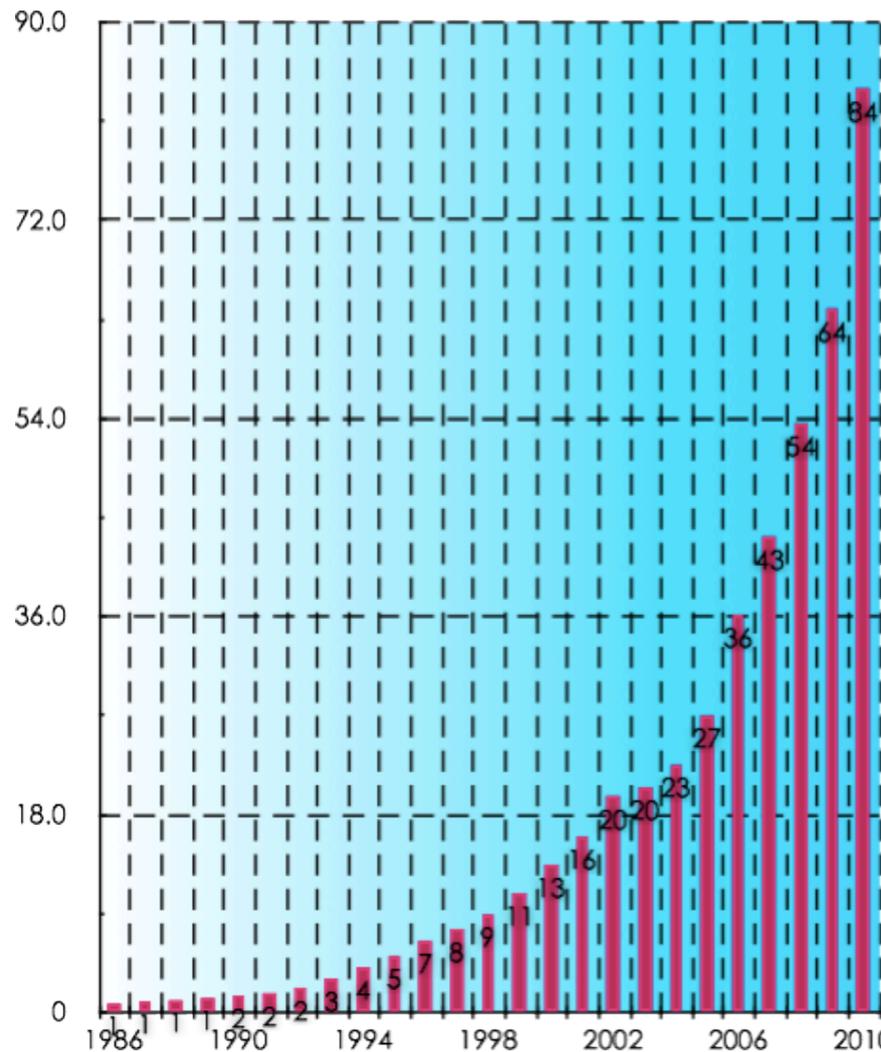


# Research Universities in China



# Research activities

- Promote top universities
  - 211 and 985 projects
  - increasing national R&D investment
  - improving common facilities
- Dramatic improving the research output



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□ Could the huge investment change science and education in China?

- yes, it will certainly bring more scientific output
- but, we need reform the education and research systems
- and maybe, more humanities



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# What do we need in the future?

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- What do we hope for the next generation
  - From human civilization point of view
    - world peace
    - harmonious coexistence of man and nature
  - From development of China point of view
    - educated human resource that be able to adopt and lead the future
    - resolve the critical issues facing to the country, including economic, social and political development, health, resources, environment etc.
  - From students and their family point of view
    - decent job and good life
- Can universities meet these requirements?
  - scientism and humanism
  - western modernization and Chinese tradition

# Scientific dictator?

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- Concept difference
  - “科学” in Chinese context means “science”, it also means “absolutely right” or “rational”.
  - nobody challenge the role of science and technology in human civilization
  - replace Chinese traditional philosophy with western “democracy and science” in “五四运动” about 100 years ago
- More humanities?
  - science and technology along cannot solve the future challenges of the world
  - Chinese concept
    - respect mature
- Restore the scientific culture in China

# The research culture does matter

- Advantages
  - many current and future critical issues encountered in the development
  - increasing investment in R&D
  - many young talents willing to devote to sciences
- Confused research culture
  - be eager to achieve quick success and get instant benefits
  - short sighted and pay too much attention to quick publications and ranking
- Influence of traditional Chinese culture
  - engineering tradition
  - blind worship or ever-respect to the authority, lack of challenging and criticism

## EDITORIAL

### China's Research Culture

GOVERNMENT RESEARCH FUNDS IN CHINA HAVE BEEN GROWING AT AN ANNUAL RATE OF MORE than 20%, exceeding even the expectations of China's most enthusiastic scientists. In theory, this could allow China to make truly outstanding progress in science and research, complementing the nation's economic success. In reality, however, rampant problems in research funding—some attributable to the system and others cultural—are slowing down China's potential pace of innovation.

Although scientific merit may still be the key to the success of smaller research grants, such as those from China's National Natural Science Foundation, it is much less relevant for the megaproject grants from various government funding agencies, which range from tens to hundreds of millions of Chinese yuan (7 yuan equals approximately 1 U.S. dollar). For the latter, the key is the application guidelines that are issued each year



to specify research areas and projects. Their ostensible purpose is to outline "national needs." But the guidelines are often so narrowly described that they leave little doubt that the "needs" are anything but national; instead, the intended recipients are obvious. Committees appointed by bureaucrats in the funding agencies determine these annual guidelines. For obvious reasons, the chairs of the committees often listen to and usually cooperate with the bureaucrats. "Expert opinions" simply reflect a mutual understanding between a very small group of bureaucrats and their favorite scientists. This top-down approach stifles innovation and makes clear to everyone that the connections with bureaucrats and a few powerful scientists are paramount, dictating the entire process of guideline preparation. To obtain major grants in China, it is an open secret that doing good research is not as important as schmoozing with powerful bureaucrats and their favorite experts.

This problematic funding system is frequently ridiculed by the majority of Chinese researchers. And yet it is also, paradoxically, accepted by most of them. Some believe that there is no choice but to accept these conventions. This culture even permeates the minds of those who are new returnees from abroad; they quickly adapt to the local environment and perpetuate the unhealthy culture. A significant proportion of researchers in China spend too much time on building connections and not enough time attending seminars, discussing science, doing research, or training students (instead, using them as laborers in their laboratories). Most are too busy to be found in their own institutions. Some become part of the problem: They use connections to judge grant applicants and undervalue scientific merit.

There is no need to spell out the ethical code for scientific research and grants management, as most of the power brokers in Chinese research were educated in industrialized countries. But overhauling the system will be no easy task. Those favored by the existing system resist meaningful reform. Some who oppose the unhealthy culture choose to be silent for fear of losing future grant opportunities. Others who want change take the attitude of "wait and see," rather than risk a losing battle.

Despite the roadblocks, those shaping science policy and those working at the bench clearly recognize the problems with China's current research culture: It wastes resources, corrupts the spirit, and stymies innovation. The time for China to build a healthy research culture is now, riding the momentum of increasing funding and a growing strong will to break away from damaging conventions. A simple but important start would be to distribute all of the new funds based on merit, without regard to connections. Over time, this new culture could and should become the major pillar of a system that nurtures, rather than squanders, the innovative potential of China.

—Yigong Shi and Yi Rao

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# Universities without “soul”

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- often observed
  - emphasis on teaching rather than learning
  - emphasis on knowledge rather than value
  - emphasis on technical skill rather than capability
  - pay more attention to research rather than teaching
  - pay more attention to the ranking rather than the long-term overall competence
- Restore the soul of university
  - truth
  - care
  - independent



# Restore Chinese tradition in higher education

- Successful education experiences
  - “因材施教”：education or cultivation should be done in accordance with the aptitude of individuals
- traditional Chinese learning as the core value, western science, technology and management as a tool
- Thoughtful concepts
  - “天人合一”：
    - harmony of nature and man, respect nature
  - “士大夫”精神：
    - “修身，齐家，治国，平天下”
    - independence, responsibility, care, humanity
  - “实事求是”：
    - respect the fact and pursuit the truth

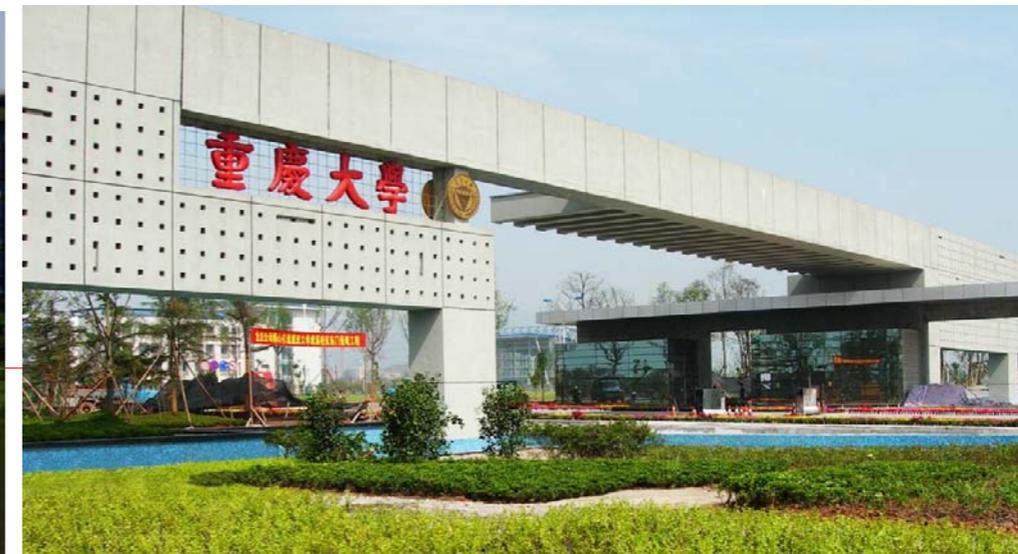


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# About Chongqing University

- Simple facts
  - undergraduate: 29,000
  - postgraduate: 17,000
  - faculty and staff: 5,600
  - faculty and schools:
    - faculty of engineering
    - faculty of built environment
    - faculty of information science and technology
    - faculty of arts and sciences
    - school of law
    - school of business



# Faculties

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## □ Faculty of Engineering

- School of Mechanical Engineering
- School of Materials Science and Engineering
- School of Power Engineering
- School of Electrical Engineering
- School of Resources and Environmental Science

## □ Faculty of Information Science and Technology:

- School of Computer Science
- School of Software Engineering
- School of Automation
- School of Communication Engineering
- School of Optoelectronic Engineering

## Faculty of Built Environment

- School of Urban Construction and Environment Engineering
- School of Architecture and Urban Planning



# Faculty of Arts and Sciences

## Schools:

- School of Chemistry and Chemical Engineering
- School of Bioengineering
- School of Mathematics and Statistics
- School of Physics
- School of Arts
- School of Literature and Journalism
- School of Foreign Language
- School of Sports Education
- School of Public Administration
- School of Life Science
- Film Academy
- School of Law
- School of Economics & Business Administration

## Interdisciplinary Research Platform:

- Institute for Advanced Studies in Humanities and Social Sciences
- Innovative Drug Research Institute
- School of Biomedical Engineering

The Institute for Advanced Studies in Humanities and Social Sciences (IAS) is committed to create a unique platform for high-profile scholars in fields of humanities and social sciences to lead high-standard research programs that cross professional and disciplinary boundaries, providing support for the university sustainable discipline development and students education.



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Chongqing University

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Southwest University of Political Science and law

Chongqing Medical University

Sichuan International Studies University

● Thank you