Building A Harmonious Academic Ecology in China

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1. Theories on Academic Ecology
2. Imbalance in Academic Ecology
3. Parameter 1： Resource allocation in Scientific Research
4. Parameter 2： Evaluation or Assessment Mechanism in Science and Technology

2

Ⅰ Theories on Academic Ecology

- Concept
- Aim of Study
- Academic Ecological System

3

1.Concept

- **Academic ecology is an ecological system where science workers--the main force--conduct complex academic studies and scientific activities with aim of innovation.**
- **According to social ecology, environment around people can be such natural environment as physical, chemical or biological environment. Also it refers to political, economic, cultural, interpersonal, psychological and other social (cultural) psychological environment. The factors induced from social (cultural) psychological environment can be also studied as ecological factors.**
- **Academic ecology is not only "biological existence" but also "social existence".**

4

2. Aim of Study

- Key of study: the relationship between scientists and their working environment;
- Purpose of study: to make full use of resources; to optimize discipline structure so as to obtain further development and bring out the optimum ecological function of the system (through optimizing ecological environment) .

5

3.Academic Ecological System

- **Academic ecological system: a complex system consist of ecological factors interlaced in multi-dimensions. It is an organic combination between the sub-systems of academic subject and of its environment in certain time and space.**
- **Academic ecological system consists of inner structure (academic community) and outer structure (Science, Technology and Society).**
- **Inner structure of academic ecology: a network consist of ecological subjects as academic researchers, teachers, users, administrators, etc. and its relevant ecological factors in different disciplines, departments, institutions and regions.**

6

- Outer structure of academic ecology— mainly refer the outer environment which academic research relies on—includes:
- Natural environment： non-biological environment and biological environment.
- Social environment： politics, economy, science and technology, education, policy, regulation, mechanism, organization and other factors.
- Cultural environment: prevailing social practice, tradition and custom, morals and ethics, public opinion, literature and art, religious belief etc.
- Academic ecology and its target module is to establish an ordered network which conforms to the inner logic of academic conduct and innovation process.

7

Dr. Zhang demonstrated the relationship of technology, science, education and culture with a simile: technology which benefits human beings is compared as red apple; science is the tree bearing the red apple; education is the soil, fertilizer and water which the growth of tree entails while culture is the proper temperature and sunshine that a tree cannot grow without …The advancement of science cannot separate from environment. However, for most of the time, a scientist is not able to change his environment by himself.

8

Ⅱ Academic Ecology is losing its balance

- "Imbalance" and "Variation" in Academic Ecological System:

1. False information in personnel's title, resume and their academic achievement;
2. Plagiarism, copyright infringement
3. Faking or falsifying data
4. Rules such as informed consent, privacy protection are violated in researches involving human body
5. Rules of protection of animals for experimental use are violated
6. Other misdemeanor in scientific research and study

9

- Crisis in Academic Ecology:

1. Crisis in academic aim: lack of originality, scarcity of team leader, research direction swing（paper/envelop/for-profit research）
2. Academic corruption（making academic bubbles, academic favors, money science）; （interwoven position as a administrator - researcher, Matthew Effect）
3. An imbalance between "strain of freedoms" and "strain of restriction"
4. The channel of free and equal academic exchange is not clear and smooth
5. The serious mis-match between real practice and function entailed by position in academic administration
6. Reductionism in academic evaluation (SCI counting)

10

3. One of the Parameters of Academic Ecology: resources allocation system in scientific research

I think the biggest barrier offsetting the advancement of science is social factors and they represent themselves in two forms: economy and ideology. Regarding economy, poverty usually is a barrier. However, in recent years, richness has loomed as a barrier, too. Too much money result in too little thought. In such adverse circumstances, scientific spirit has fallen into crisis despite of progress. "Great Science" (Big Science, Mega-science, Large Science) may destroy great science. The dramatic increase of publication may kill thinking. Valuable thinking is drowned in this flood instead.

——Karl Popper

11

- $136 billion was invested in scientific research in China in 2006, surpassing Japan ($130 billion), next to US ($330b) and EU (15 countries, $230b) ranking No.3.
- In 2006, China's R&D input intensity is 1.42%.
- Statistics revealed that, measured from the five A-level indexes indicating the comprehensive level of ST advancement in a country, input in ST activities nationwide, environment for ST progress, technology transfer regarding high and new technology, the index of social and economic development propelled by ST were enhanced compared with last year. But the index of ST activities output was reduced by 3.11%.
- None of the major researches' citation rate ever reaches the average level of the world. The output of highly influential papers takes a lower percentage than that of the paper does in the world .

----CAS (Chinese Academy of Sciences) : "A Report on Science Development in 2007"

12

Technological dependency is still severe:

- China's dependency on technology from foreign countries is as much as 50% while around 5% of the US and Japan's technology rely on other countries. China's total number of patent accounts for 2% in the world.
- There are 994, 779, 286 people acquiring patent in every million people in Japan, Korea and US respectively. In China, only 1 person per million obtains patent.
- Poor self-dependant in key technology. Key equipment with high-tech almost completely relies on import .
- The policy environment that values innovation capability construction and protects the legal rights of those who lead in innovation is not cultivated yet.

——CAS: "A Report on Science Development in 2007"

13

- Chinese scientists involved in leading positions in 158 major international science organizations and its 1566 sub-organizations account for 2．26% of all. Among them, only one works as Chairman in the major international organization and 1% of Chinese scientists work as Chairman in the sub-organizations.

——Xinhua Net "Biggest number of scientific workers in the world facing a shortage of leading scientists"

- International Institute for Management Development，Lausanne, published "World Competitiveness Yearbook 2007" on May 10
- According to the evaluation of the World Competitiveness, China's international competitiveness ranking in 2007 enhanced from 17 in previous year to 15 of 55 countries and regions all over the world. Evaluation index is divided into 3 categories based on country's ranking: advantage index（ranked from No.1 to No.20）, medium index (ranked from No.21 to No.40) and disadvantage index（ranked after No.40）.

14

- China has 9 advantage indexes, same as previous year. Among them, "R&D personnel's full-time equivalent " ranked No.1 The indexes of "total amount of R&D fund", "total amount of R&D fund in enterprises", "the number of published ST papers", "the number of patent granted to natives" and other 6 indexes had a rank among top 10 in the world.
- But the rank of index "whether fundamental research helps strengthen economic development in long term" dropped from No. 6 in previous year to No. 17.
- China has 8 medium indexes including two soft indexes of "whether IPR is well protected" and "whether scientific research has legal support" and 6 hard indexes such as "the percentage of R&D fund in GDP"、"the number of R&D personnel per thousand people" and "ownership of foreign patent by native people".
- One disadvantage index—the number of effective patent per 100,000 residents—ranks 42.

15

Main problems in scientific research input system:

- segmented authority，contradictory policies resulting from conflicting departmental interests，overlapping research projects, low efficiency of research fund.
- Competitive programs/projects constitute a majority, driving science workers to spend much time and energy obtaining the program/project and surviving the evaluation.
- Government's multiple roles: supervising both fund and project; being both investor and "operator"

Measures on improving scientific research input system：

- Building a national distribution and coordination mechanism on scientific research fund.
- Transforming government's function. Management on scientific research fund needs to be improved.
- Adjusting the percentage of competitive projects and introducing sustainable and cycling input mechanism.

16

- **ST Ecological Environment Parameter 2：ST Evaluation Mechanism**

When a goal is shaded by measures, such a danger is resulted: lost in a maze of measures, one forgets his ultimate goal.

——Simmel

17

（1）Multiple shortcomings of rigid ST evaluation criteria based on quantity:

- The overheated focus on the level of the project and the amount of fund – a deviation from science itself.
- Narrow scope of journals is not healthy for multicultural academic research；
- It is difficult to evaluate scientific achievement on quantitive basis，numbers cannot scientifically reflect the value of results ；
- Too much assessment and reviews does not accord with the natural cycle of scientific research；
- Assessment entails trivial and detailed work, consuming too much time and energy of researchers.

18

- The pure quantitative management on academic achievement is, in nature，the mirror of executive administration in the evaluation of scientific researchers. Its core— enthusiastic pursuit of technical operability in practice—leads to unscientific routinization and standardization on academic control, thus science workers have to live by passive submissiveness.
- The non-utilitarian nature of scientific research conflicts with quantitative assessment standard and the monetary incentive attached to it, leading to impatience and even misdemeanor among science workers.

19

- **The over-quantitative evaluation system is employed to measure and assess uncertain scientific activities. Consequently, successful results and promises are made by almost all projects when it goes to fund application.**
- **But it is certain that a project which is expected to be successful is not an innovative one since it has been experimented and studied before. At least, it involves little risk.**
- **The evaluation system does not fit in or accord with the law of scientific development. It is this fact that drives scientific researchers to shun from original and risky projects so that they have better chances to win resources.**
- **The spread of academic utilitarianism probably will drive scholars to resort to unreasonable, immoral and even illegal measures to achieve their goals. To be worse, they may work together with some resource distributors for illegal profit, encouraging corruption in academic circle.**

20

（Ⅱ）Building an ST Evaluation System Consistent with Academic Ecology

1. Make reasonable use of quantitative assessment. Stress the evaluation on originality and innovativeness of academic achievements:

- Prolong the time span for assessment;
- Give high priority on innovativeness and other indexes reflecting academic level, citation frequency of academic paper, impact on society and cultural contribution;
- Assessment from peers is encouraged. The assessment from a third party such as association needs to be introduced. The roles of societies and associations should be brought into full play in ST achievement assessment, evaluation of science workers and rewarding.

21

2.Reforming National Rewarding System:

- Reducing the number of rewards and shrinking the hierarchy of rewards. Highlighting the key directions in government's rewards. The award on natural science is managed by academic community; ST advancement reward should be reflected by social profit; invention award by patent.
- Heeding the awards to talents while awarding the project;
- Prolonging the cycle of awarding so that the awarded project truly reflects the progress in ST development in China.
- Evaluation criteria for talents in different fields shall be established based on the developing rules in their particular field. Creating a more relaxed working environment for researchers;
- Raising the threshold for talent evaluation. To establish talent assessing and hiring system that is close to international practice.

22

3. Strengthening the Construction of Academic Ethics, Honesty and Credibility System：

Scientists' rules of conduct （the ethos of science)--Merton

⑴ Communalism. Knowledge is communal；

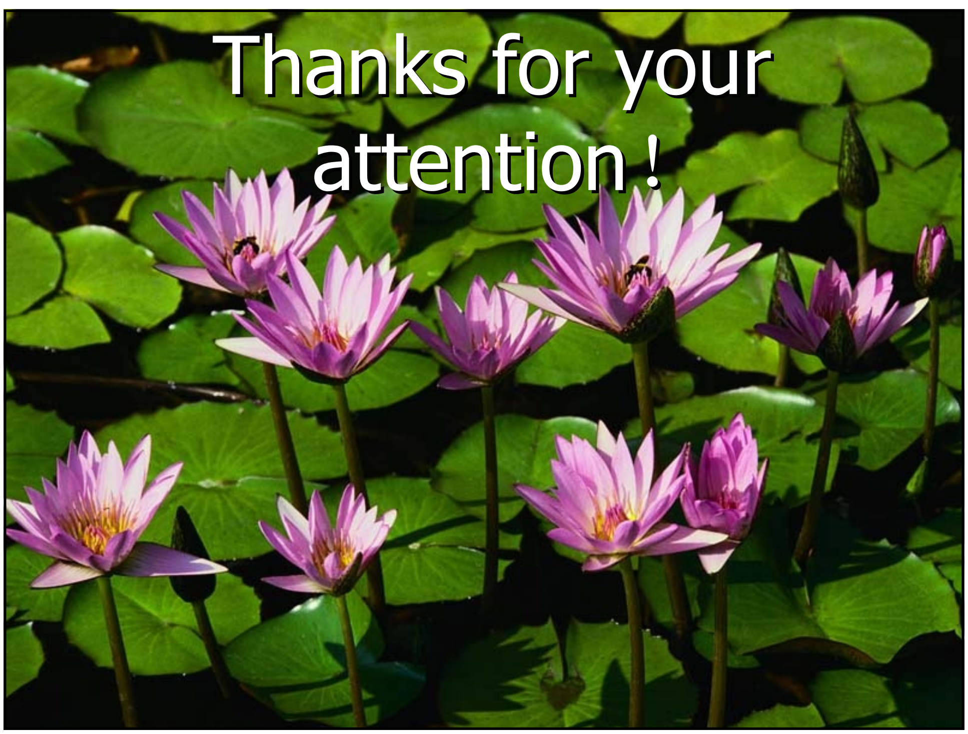
⑵ Universalism. No boundaries of hierarchy, nationality or countries. Scientific standard is universal；

⑶ Disinterestedness. Scientists' conduct shall have no emotional or financial attachments；

⑷ Originality. To think independently; to innovate originally and oppose plagiarism；

⑸ Skepticism. Science never yields to any authority.

23



2006 NSF general programs funding list （according to attachment）

unit of amount：10,000yuan RMB

	total		Ministry of Education		CAS		Engineering,Transportation,Agricultre, Medical cience,Defence and other deps		States/cities	
	item	amount	item	amount	item	amount	item	amount	item	amount
total	10271	268,595.00	4725	122,520.80	1487	43,906.50	1450	38,027.00	2609	64,140.70
%	100	100	46	45.62	14.48	16.35	14.12	14.16	25.4	23.88
Applied Sciences	1095	30,307.00	475	12,785.00	246	7,799.00	124	3,539.00	250	6,184.00
%	100	100	43.38	42.18	22.47	25.73	11.32	11.68	22.83	20.4
Chemistry	1109	28,848.00	572	15,060.00	211	5,719.50	55	1,422.50	271	6,646.00
%	100	100	51.58	52.2	19.03	19.83	4.96	4.93	24.44	23.04
Life Science	3863	96,347.00	1542	39,014.00	344	9,161.00	700	17,598.00	1277	30,574.00
%	100	100	39.92	40.49	8.9	9.51	18.12	18.27	33.06	31.73
Earth Science	1064	35,158.00	368	12,184.00	390	13,415.00	165	5,257.00	141	4,302.00
%	100	100	34.59	34.65	36.65	38.16	15.51	14.95	13.25	12.24
Material Science and Engineering	1563	43,207.00	862	23,830.00	132	3,767.00	210	5,728.00	359	9,882.00
%	100	100	55.15	55.15	8.45	8.72	13.44	13.26	22.97	22.87
Informatics	1102	26,235.00	567	13,571.00	147	3,748.00	164	3,911.00	224	5,005.00
%	100	100	51.45	51.73	13.34	14.29	14.88	14.91	20.33	19.08
Management	475	8,493.00	339	6,076.80	17	297.00	32	571.50	87	1,547.70
%	100	100	71.37	71.55	3.58	3.5	6.74	6.73	18.32	18.22