The two engines that drive science in China

The top nine Chinese universities (Beijing University, Tsinghua University, Zhejiang University, Harbin Institute of Technology, Fudan University, Shanghai Jiaotong University, Nanjing University, University of Science and Technology of China, and Xi'an Jiaotong University) signed an agreement on 12 October 2009 for fostering and exchanging students. Called as 'the Chinese Version of the Ivy League' or the C9, they will also contribute towards Chinese scientific innovation.

Science is fast developing in China marked by a rapid increase in the number of papers and citations in ISI databases[1]. Chinese research has drawn the attention of the international scientific world[2,3]. The Chinese Academy of Sciences (CAS) and the C9 are the main scientific innovation groups in China.

According to the latest data from the ISI-ESI (Essential Science Indicators) database (1 January 1999 to 31 August 2009), the number of papers and citations of the C9 exceeds that of the CAS as shown in Table 1.

The University of Science and Technology of China (USTC) belongs to both C9 and CAS because part of its faculty belongs to the CAS. If we exclude USTC, Harbin Institute of Technology and Xi'an Jiaotong University, the top six Chinese universities (C6: Beijing University, Tsinghua University, Zhejiang University, Fudan University, Shanghai Jiaotong University, Nanjing University) together almost equal the CAS in output. Figure 1 shows the data (source: http://esi.isiknowledge.com/home.cgi/) of the C6 and CAS in three stages, from 1 January 1996 to 31 December 2006, 1 January 1997 to 31 December 2007 and 1 January 1998 to 31 December 2008, which reflect Chinese scientific development.

Table 2 shows the percentages of the three stages, where number of papers is called as 'output' and citations as 'impact'.

We see that the CAS and C6 contribute about 40% of papers and 45% of citations within China. This shows disproportionately strong scientific contributions from more than 2000 universities and other institutions in China[4]. The CAS and C9 together contribute more than 45% of output and 50% of impact in China, which means that the CAS and C9 are vigorously promoting scientific development. So, we can say that the CAS and C9 (or even the C6) are the two engines that drive science in China.

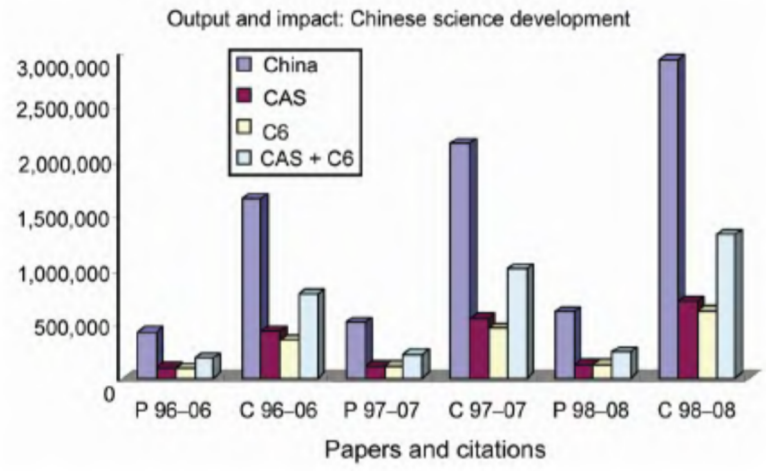

Figure 1. Chinese scientific development: Data indicators.

Table 1. Papers and citations of the C9 and CAS in relation to those of China as a whole

Statistical unit	*P* (Papers)	*C* (Citations)	CPP*	*P* (%)	*C* (%)
China	6,49,689	3,404,466	5.24	100	100
CAS	1,25,695	816,877	6.50	19.35	23.99
C9	1,60,013	908,008	5.67	24.63	26.67
CAS + C9	2,85,708	1,724,885	6.04	43.98	50.67

*CPP, Citations per paper.
Data source: http://esi.isiknowledge.com/home.cgi/

Table 2. Scientific output and impact percentages of CAS and C6 in China

Unit	*P* 96–06 (%)	*C* 96–06 (%)	*P* 97–07 (%)	*C* 97–07 (%)	*P* 98–08 (%)	*C* 98–08 (%)
China	100.00	100.00	100.00	100.00	100.00	100.00
CAS	22.44	25.81	21.38	25.39	20.05	24.11
C6	21.29	21.21	20.92	21.41	19.80	21.01
CAS + C6	43.73	47.01	42.31	46.80	39.84	45.13

Data source: http://esi.isiknowledge.com/home.cgi/

1. Thomson Reuters, http://researchanalytics.thomsonreuters.com/grr/ (2009-11-2).
2. Leshner, A. I. and Turekian, V., *Science*, 2007, **318**, 1523.
3. Suttmeier, R. P. *et al.*, *Science*, 2006, **312**, 58.
4. Ye, F. Y., *Curr. Sci.*, 2009, **97**, 744–745.

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