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## CHINA RANKS SECOND IN SCIENTIFIC PUBLICATIONS SINCE 2006



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**Abstract:** With the fast development of its economy, China plays an increasingly important role in the world. China's performance in science is also impressive. The exponential growth of Chinese scientific publications provides evidence. However, statistical results about China's world share of scientific publications provided by different institutions and researchers have been in disagreement. With the data for 2007 being now available, we provide an update on this issue and conclude that China has become the second largest producer of scientific publications since 2006.

**Keywords:** China, SCIE, scientific publications, world share, rank

Various analyses of the growth of scientific literature showed that China became a leading nation in science (Zhou & Leydesdorff, 2006; Kostoff, 2007a). In high-tech fields, China's performance in nanotechnology and space technology is worth mentioning: China's share of publications in nanoscience and nanotechnology grows steadily and is closing the gap with that of the USA (Leydesdorff & Zhou, 2007; Kostoff, 2007b). The successful launch of the satellite Chang'e-1 for lunar probe in 2007 showed the Chinese strength in space technology.

Statistics about China's rank in terms of scientific publications have recently been somewhat confusing. Based on data from the *Science Citation Index Expanded (SCIE)*, the Institute of Scientific and Technical Information of China (ISTIC) concluded that China ranked *fifth* in 2006 (ISTIC, 2007). The four countries ahead of China would be: the USA, the United Kingdom, Germany, and Japan. The producer of the *SCIE*, Thomson Scientific, obtained the same result

(Thomson Scientific, 2007). However, the results of these two institutions were based on different document types: the ISTIC counted all documents while Thomson Scientific included only four types of documents: articles, notes, reviews, and proceedings. The resulting figures about China's world share of publications were 5.9% (ISTIC) and 7.75% (Thomson Scientific).

Based on the same database (*SCIE*) but using different document types (articles, letters, notes, and reviews), Leydesdorff & Wagner (2007) had earlier concluded that China was the second country in the ranking already in 2006. Considering this ambiguity, we decided to repeat the measurement including 2007, when the *SCIE* data for the year 2007 was completed in January 2008. What is China's position in the world of science in terms of scientific publications? Did the exponential growth curve continue?

Figure 1 provides the evolutionary track of major countries and world regions in terms of percentages of world share of scientific publications based on the *SCIE*. In accordance with standard scientometric practice we used only four types of documents: articles, letters, notes, and reviews. Data was collected on January 14, 2008. This database allows for integer counting.

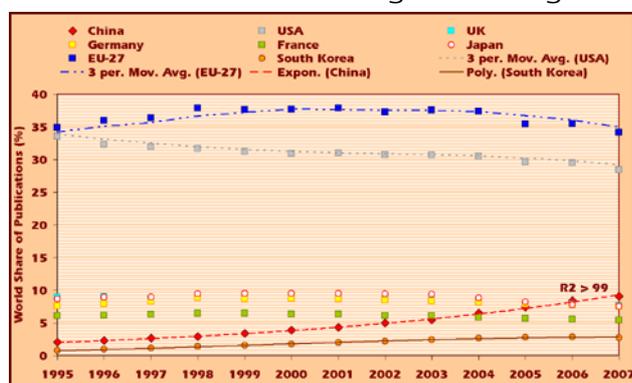


Figure 1 Percentages of world share of publications of selected countries/regions (1995-2007, *SCIE*)

In 2007, China ranks second beyond further doubt. Only the USA stands ahead of China. Using this indicator, China was already second in 2006, but the differences between China and the UK or Germany were so small that the use of different parameters could easily lead to different results. In 2006, China's percentage of world share of publications was 8.4%, while the corresponding percentages for the UK and Germany were 7.8% and 7.7%, respectively. In 2007, China's world share increased to 9.1% in 2007, leaving the UK

(7.7%), Germany (7.5%), and Japan (7.6%) further behind. The differences are no longer marginal and the other large units are stable or relatively declining in terms of percentages.

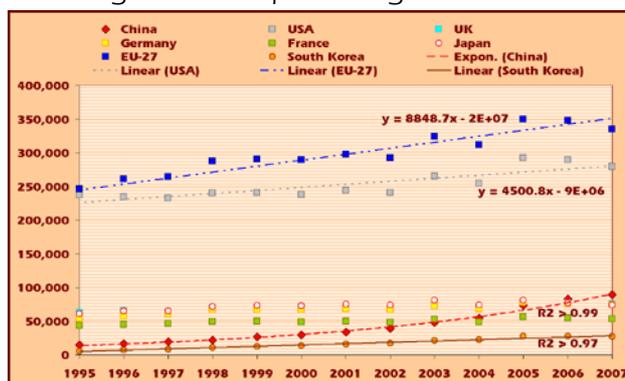


Figure 2 Numbers of publications of selected countries/regions (1995-2007, *SCIE*)

In terms of absolute numbers (Figure 2) and given this database, both the EU and the US have been increasing their numbers taking a longer-term perspective (Hill et al., 2007; NSB, 2008), but these absolute numbers declined during the last three years. The exponential curve provides an almost perfect fit for China's contributions using these figures, too. The UK, Germany, Japan, and France have been relatively stable using this indicator.

The Chinese path of development is unique among scientific nations: China's world share of publication has been growing exponentially both in absolute and relative terms. China is gaining and other major countries/regions are accordingly losing percentage world shares. Different countries/regions reached their production peak at different times. Based on figure 1, the USA has already been going down in relative terms since 1995. The EU reached its peak in 1998 and began to go down more recently. Only China is an exception: it is still on the way of climbing uphill.

The publication development of small countries is shown in Figure 3 using South Korea as the example. South Korea experienced a booming growth in the past ten years. In 1995, the world share of South Korea was the lowest among the countries included in Figure 2 for the comparison. However, it overtook Taiwan in 1997, left Switzerland behind in 2001, and passed the Netherlands in 2004. In 2006, the curve for South Korea seems to have reached its peak, and to bend off to its equilibrium level in the competition for scientific publications.



Figure 3 World share of publications of some small countries (1995-2007, SCIE)

Taiwan has also known linear growth for more than a decade. Linear growth is the normal pattern for a country which enters the world scene. For example, the figures for the Netherlands showed linear growth during the 1980s and the percentages for Italy and Spain grew linearly during the 1990s (Leydesdorff, 2000).

In summary, China has been the second largest country in terms of scientific publications during the last two years. Unlike most developed countries or regions which have reached their competitive potential in scientific publications, China is still growing. As an important Asian country in science, South Korea had experienced booming during the past ten years, but has reached its peak in scientific output. Taiwan has kept linear growth in the past ten years, and has not yet reached its full potential.

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