

Bringing Chinese research to the world

To be a global leader in science, there are three key elements required of any economy: talent, state-of-the-art infrastructure and access to information. China's ambitious plans to become the world's science hub mean the country is faced with some significant challenges, with its history of social upheaval that has left huge disparities in wealth, education and access to the most basic healthcare and a culture that values visible, tangible resources over electronic tools and information.

Despite these potential barriers to growth, it is an exciting time for science in China and the market provides a significant and interesting opportunity for publishers.



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Introduction

When I first came to China in 1985 as a fledgling college graduate, my mission was to teach English at Xiangya Medical College in Hunan province. I coached a special class of first year college students on the language skills they would need to stay abreast of scientific journals and the West's advances in medicine. Twenty years on, when I returned to live in Beijing with my own family, I found not only that I had a strong southern Hunan accent to temper – but my former students had propelled their way to the forefront of international scientific research. It has been incredibly stimulating – personally and professionally – to experience this dynamic shift first hand in China and find myself working for a leading publisher of these same scientific journals.

For China today, scientific and technological innovation represent the future for the country's ever-strengthening economy. China is now one of the biggest consumers of scientific literature in the world, and through government investment and backing, its scientists are also major contributors to the wealth of literature available globally, with the country currently ranked fifth in the world in the number of published papers.

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upheaval that has left huge disparities in wealth, education and access to the most basic healthcare and a culture that values visible, tangible resources over electronic tools and information.

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Great oaks from little acorns grow

From 1966 to 1976, China was in the midst of a cultural revolution with universities and schools closed for much of this time. When the country finally stabilized, there was huge demand for education at all levels – and an equally huge demand for all of the resources and infrastructure a sound education system requires. Libraries too were scarce on funding, and this led to a significant amount of print piracy occurring across the nation. To meet the demand for research, libraries would purchase one copy of a journal, and have several copied versions available for public use. Walking into a library, you would be met with two distinct areas: one area with the genuine journals, the other area full of photocopies.

In 1978 the government announced a systematic programme to build up China's top universities, typically located in the country's richest provinces in the east. This was part of what was known as the 'Reforms and Opening Up' policy and focused on modernizing agriculture, industry, science and technology, and the military. A total of 200 institutions in China were earmarked to become world class.

Significant resources were invested to ensure these universities benefited from the best programmes and facilities available. When you walk around a university in China today, the campuses are impressive – beautiful grounds and state-of-the-art facilities. Science labs offer the latest hi-tech equipment and libraries are very well equipped. This trend continued until 2004 – every university department benefited from the financial injection, with libraries enthusiastically purchasing serials and taking up electronic databases.

In 2005, the resources seemed to diminish. The Chinese government had new issues to tackle. The country once seen as having the most equal distribution of wealth faced some significant social inequalities. This is still particularly evident in China's south-western rural areas, where people have lost access to public resources including basic education and health services. With universities up to speed, the focus switched to a rural education infrastructure. As China's entire education system is state-owned, it's in the government's court to address this issue.

A direct policy outcome of this shift in focus has been to take some of the financial burden tied to education away from families. One of the unusual aspects of the traditional education system is that despite being state-owned, families are still required to pay fees to send their children to school and university. Last year, a programme was piloted to eliminate tuition fees for the poor. Now, people in rural areas across China no longer pay tuition fees. However, with government spending focused on tuition, they have now cut library budgets. The 'fat years' as they are called, are over.

For those of us in the business of serials, these factors provide significant barriers to growing business in China. There is an ongoing need for publishers to convince librarians that it is worthwhile to renew or upgrade their subscriptions. Although this situation can make renewal discussions frustrating from both sides, there has not been a noticeable impact on subscriptions of electronic resources to date, though librarians have

been far slower to take up new products. While China still purchases far more books relative to e-journals, they understand that digital is the future.

Ultimately, the need for large-scale access to world-class information is very real. China, like all strong economies, needs databases such as ScienceDirect, Springer Link, and Web of Science to ensure the growth of its intellectual property. Their librarians recognize the value publishers add through the peer review process as well as countless other programmes that exist to train Chinese librarians and researchers on all elements of the research process. This also helps to ensure they meet western standards in terms of quality.

Just over a year ago the President of China, Hu Jintao, gave a speech prioritizing science and technology research and development to 2020. This is a significant step forward for the country. China's spending in the sector is now only behind Japan and the United States. In turn, universities and institutions are making plans of their own, making this target for global science power achievable.

The country's leaders are deeply aware that China, for many years to come, will remain an emerging market. But they have proved they are up to the challenge. From 1978 to 2004, China's GDP increased from US\$147.3 billion to \$1.6494 trillion with an average annual growth rate of 9.4 per cent¹. Its foreign trade rose from \$20.6 billion to \$1.1548 trillion, averaging an annual growth rate of over 16 per cent. In 2007, Real GDP will hold at an estimated 9.5 per cent.²

In fact, China's rapid economic growth over the past two decades has accounted for well over half of all growth in the developing world.³ China's economy is projected to become larger than Japan's in the next decade, with many economists pointing to the possibility of China surpassing the US economy within 50 years.

China: the next world leader in science?

To be a global leader in science, there are three key elements required of any economy: talent, state-of-the-art infrastructure and access to the world's scientific information. In terms of talent, China is certainly focused on recruiting the human capital it requires to drive innovation forward. The country is aware of its traditional reliance on foreign

standards and technology, and is committed to nurturing indigenous innovation. China is working smarter. A new 'Western Scholars Programme' aims to bring back Chinese nationals who have been trained and are now working overseas. Huge investment has been injected into this programme, offering scientists and researchers large financial incentives and state-of-the-art facilities to return to their home country. And it's working. This programme provides a framework for other nations facing the same loss of human capital. India and Russia are great examples of countries who have suffered a proverbial brain drain when it comes to science and technology experts.

China is well on its way to meeting the second criteria – its world-class facilities offer a huge incentive for scientists around the world. The government investment in infrastructure during the years of plenty has paid off. Not only has China added buildings and invested in the latest equipment in the scientific laboratories, but one can see a master plan in the development of telecommunications to support high speed access among the scientific users. More than a thousand universities, 400,000 faculty, and over 2,000,000 students as well as 500 campus networks are connected to the China Education and Research Network (CERNET), the information superhighway that supports education and research in China.⁴

CERNET is one arm of the China Academic Library and Information System (CALIS) which is the nationwide academic library consortium funded by the Chinese government, under the leadership of the Ministry of Education. The mission of CALIS is to promote, maintain and improve library resource sharing among universities. The CALIS organization is located in the Peking University Library and is responsible for the central administration and infrastructure of the consortium. A major target of CALIS is to build the China Academic Digital Library and they have been very active in licensing scientific and technical information for all the major universities in China. The growth of databases and publisher e-journal packages has all been the result of an active programme of expanding resources for the Chinese research and education community.

Major scientific and technical publishers' titles are well represented in China. Companies such as Elsevier, Springer, Wiley, American Chemical, IEEE and CSA are just some of the publishing houses that have completed licence arrangements with

CALIS. It is not uncommon to walk into any major Chinese library in the top 600 institutions and find that they have access to a wide range of STM material all delivered to their desk-top depending on the terms and conditions of the licence. ScienceDirect, Springer Link, OCLC's First Search, Lexis-Nexis, EBSCO's Academic Source Premier and a host of other databases are all available. The average Chinese student in any scientific discipline has a wide range of information at their fingertips. The problem that they face is having the back-files. During the years of Cultural Revolution and other unrest, libraries did not collect much STM material so few libraries have the depth that is needed to conduct research. However, as more publishers complete their archive projects, access to older material will also be supported. Having travelled in many Chinese libraries, one finds an active reference room with 800 online terminals with the latest information but venture into the library stacks and there are few print copies of any of the STM titles.

Not all universities have been recipients of the government's generosity, however. While the eastern urban areas of China, where most of the advanced universities are located, have solid infrastructure and good access to STM information, large areas of the country in the south and west are poorly served by technology. The Chinese government is stressing that development must flow westward to even out this huge disparity, but like all good things, it will take time. In essence, the 'developed' part of the country is effectively a mature market, while the 'undeveloped' areas still lack the budget and infrastructure to digest any more foreign content. This makes it challenging to grow the journals business at a rate equal to China's GDP growth, which to an outsider may seem counter-intuitive.

The future for S&T publishing in China

While the West has long been interested in Chinese medicine, researchers in China are also breaking new ground in life sciences, material sciences, chemistry, computing and surprisingly, environmental issues. In research conducted in 2005, we found that 9.4 per cent of Elsevier articles had at least one Chinese author, compared to the wider Chinese world share of 6.5 per cent⁵. Of these articles, one fifth involved international

collaborations, with academics from the United States, Japan and Germany representing the top three countries with which Chinese Elsevier authors partnered. And the interest and collaboration goes both ways: the Chinese market represents the third largest number of ScienceDirect users in the world (behind the US and UK) out of an estimated total of 11 million users in 2006. Other publishers have had similar growths in scientific output. The Royal Society of Chemistry has reported significant growth in high-quality papers submitted from faculty working in Chinese universities.

China's production of scientific content is significant, so we need to be there to support the global facilitation and distribution of their work. In fact, China is in the top five in terms of research articles; however, one problem to address immediately is the high rate of rejection for Chinese research.

In the nineteenth century, people talked of the scramble for Africa as different nations competed for influence and ownership of states. Now in the twenty-first century there is, not least among international science publishers, a scramble for China. In most cases the aim is for influence and a foothold in a large growing market. Often, as in the case of books, one must 'partner', as foreign publishers do not yet have open access to the market in this industry, despite WTO agreements. Publishers frequently encounter brother and sister publishers from other organizations when attending the Beijing Book Fair and we are often talking to the same tier of the better Chinese publishers to gain co-operation deals and co-publishing arrangements.

In the case of journals, there is also activity. Elsevier is not the only publisher distributing Chinese journal content to the world. Springer, for example, publishes some journals in collaboration with the Chinese publisher Higher Education Press. *Nature* produces a Chinese edition. The Institute of Physics Publishing, Wiley-Blackwell and others have local staff developing arrangements in China and ensuring international distribution of content. It is an active market with more and more players, both international and domestic.

Each day brings new challenges alongside the significant opportunities China offers. But Elsevier's strategy is simple. We want to support Chinese researchers with an innovative approach to create and distribute world-class content. We view ourselves as a long-term partner, helping to develop infrastructure now that will benefit researchers around the world and push the frontiers of exploration, discovery and application.

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