Rapid patenting growth by academic institutes in the Peoples Republic of China

Simon M Pratt
Thomson Scientific
June 2005

Although patent activity in Chinese academic institutions does not yet rank among the global leaders, there has been very strong growth in recent years – and it is outpacing the growth in academic output as measured by journal articles. Recent changes in government policy, a growing economy that is powering increased research expenditure, and an increased emphasis on the commercialization of research at academic institutions are all contributing to China's increased patent activity.

Introduction

Since 1980 there has been a ten fold increase in the patent activity of academic institutions throughout the world (figure 1). There are many reasons for this increase, but perhaps the largest driving force has been changes in government policy.

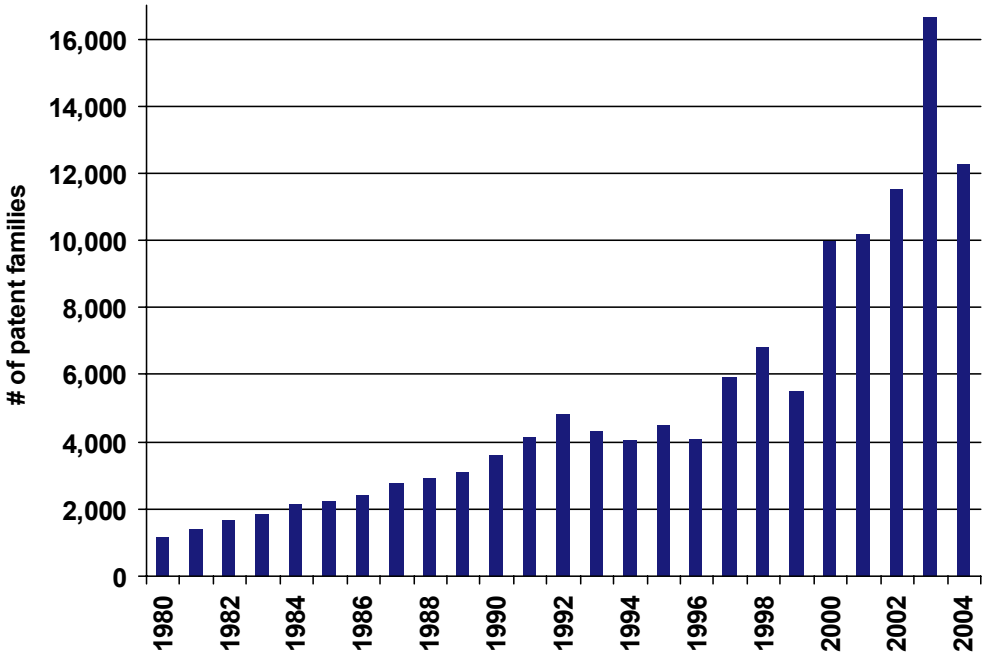

Figure 1. The increase in the number of patent applications by academic institutions, worldwide.
(Source *Derwent World Patents Index*)

Legislative changes

Since the 1970s governments around the world have placed more emphasis on applied research that results in economic benefits for the state. The 1980 US legislation known as the Bayh-Dohl Act[1] has been particularly influential. The Bayh-Dohl act allows academic institutions to own the intellectual property associated with discoveries based on federally funded research. Furthermore, institutions are encouraged to collaborate with commercial concerns, and are required to administer any patents associated with the intellectual property derived from government-funded research. Other countries introduced similar legislation throughout the 1990s.

Technology transfer

One of the outcomes of these changes in policy has been the introduction of technology transfer/ technology licensing offices (TLOs). These are tasked with managing and licensing the intellectual property rights of their research institution. However TLOs perform a variety of functions, and their scope is considerably broader than being purely administrative. In general TLOs have had a very positive influence in terms of increased awareness of the patentability of discoveries, increased collaboration with commercial enterprise, increased focus on research that results in intellectual property, and increased legal enforcement of existing intellectual property rights. All of these factors have contributed to increases in the patent activity of academic institutions.

Material benefits of intellectual property

In a recent survey by the Association of University Technology Managers[2] the 194 members of the AUTM reported that overall 2003 technology licensing revenues exceeded $1.4 billion. This constitutes a significant proportion of overall research funding, with 15 members reporting that more than 5% of their total research funding comes from technology licensing. An additional benefit of technology transfer is the timely utilization of discoveries by industry, and the passing on of better products to the consumer; this is particularly important in terms of the timely utilization of new medical therapies[3].

Whose invention is it anyway?

However, the relationship between academic research and patent ownership is sometimes not clear, with some researchers continuing to patent inventions under their individual names, without any association to an institution. Furthermore, the intellectual property associated with research that is performed at universities, but funded by industry, is generally owned by the commercial organization that provided the funding. An additional element of confusion is caused by patents being assigned to TLOs which have names that are not easily associated with the university they represent.

Increasing acceptability

Despite these drawbacks, and partly because of the benefits mentioned above, the acceptability of patents by academic researchers has improved, and today many researchers consider patents to be an important part of their publication portfolio. In some regions, notably Japan, it is now common procedure to include details of granted patents, along with articles in academic journals and society meeting proceedings, when submitting an application for government funding.

Case Study – Peoples Republic of China

Economic and research growth

The Peoples Republic of China (PRC) has experienced rapid economic growth in recent years[4]. This growth can, in part, be attributed to the PRC's entry into the World Trade Organization (WTO) in 2001. However, the PRC's poor record on intellectual property rights was considered a barrier to entry, and therefore the implementation of the TRIPS (Trade-related Aspects of Intellectual Property Rights) Agreement was stipulated as a condition of entry[5].

The rapid growth in the Chinese economy has driven increased research funding at Chinese academic institutes. Analysis has shown that the research output, measured by the number of articles published in international journals, has grown substantially since the late 1990s (Figure 2). Additionally, citation analysis of these articles has shown that the influence of Chinese academic institution on the international community has also increased.

Commercialization

An increasing trend towards the commercialization of research at academic institutes in China has led to the creation of many technology licensing organizations. In May 2003 the Ministry of Science and Technology released "*The Regulation of Enhancing Intellectual Property Protection on National Scientific Programs*"[6] which encourages the creation of university departments dedicated to intellectual property, and the investigation of existing patent literature to avoid research duplication. Furthermore, this legislation provides government subsidies for certain research projects if international patent applications have been submitted, and requires training of researchers on intellectual property.

Quantifying growth in PRC patent activity

As described above, three factors have driven a sharp increase in patent activity by PRC academic institutions:

1. The overhaul of the intellectual property policy and legislation that was necessary to comply with the TRIPS agreement.
2. The large increase in research expenditure as a consequence of the growth of the economy.
3. Increased emphasis on the commercialization of research at academic institutes.

This increase in patent activity has exceeded the increase in research output in terms of articles in academic journals (Figure 2).

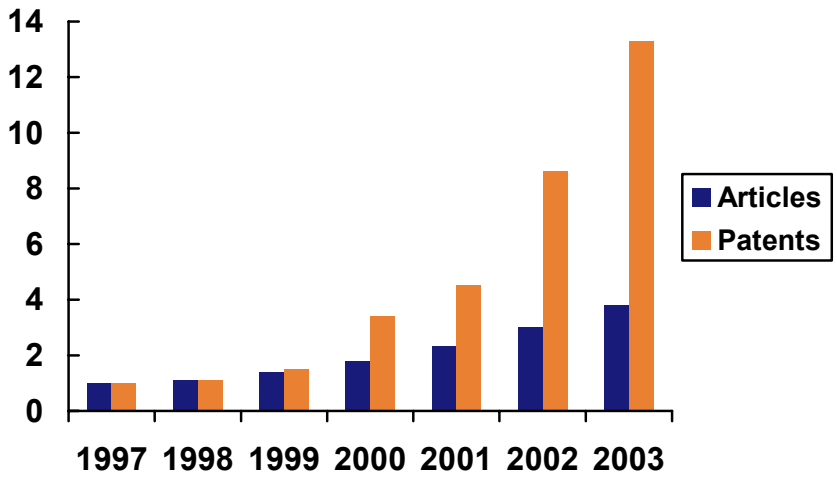

Figure 2: Growth (as a ratio of 1997 levels) in the number of PRC patent applications compared to the number of published articles
(Source: *Derwent World Patents Index* and *Science Citation Index Expanded*)

A more detailed look shows that a core group of universities are responsible for the majority of the patent applications (Table 1):

rank	Institution name	Number of patents
1	Tsinghua University	2,219
2	Zhejiang University	1,281
3	Shanghai Jiaotong U	1,155
4	Fudan University	918
5	Tianjin University	688
6	Wuhan University	469
7	Sichuan University	455
8	Nanjing University	453
9	Huazhong U of S & T	399
10	Peking University	364

Table 1: Ranking list of academic institutions and the number of patent families published (source: *Derwent World Patents Index*)

An analysis based on Derwent Classifications (figure 3) shows that the majority of these patent applications fall into the fields of chemical sciences, life sciences and engineering.

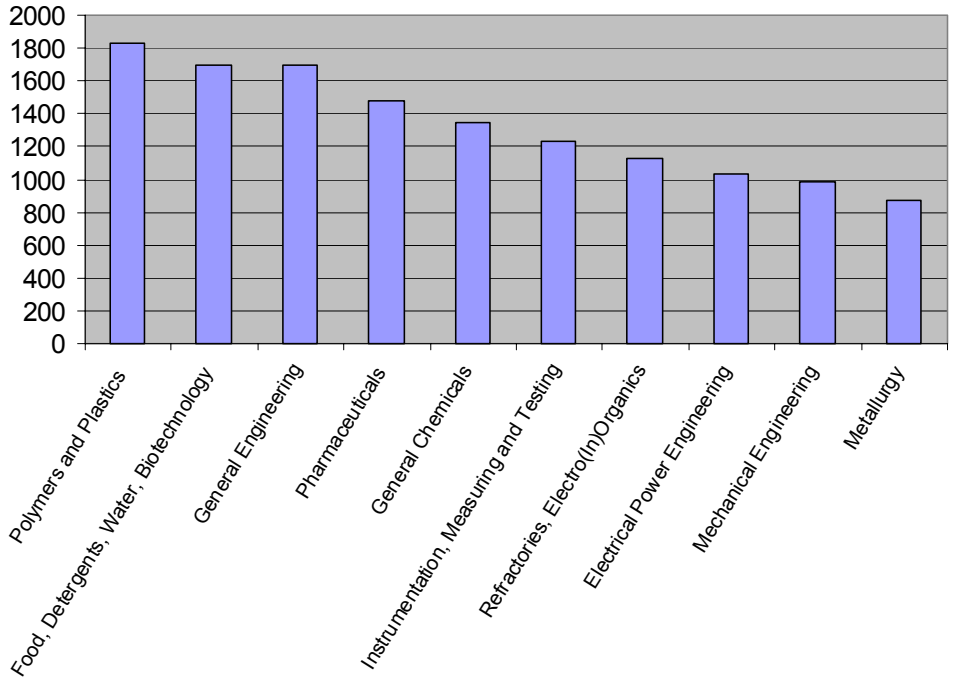

Figure 3: Breakdown of patent applications by broad Derwent Classifications
(source: *Derwent World Patents Index*)

Conclusion

Although the patent activity of Chinese academic institutions may be small when considered on the global scale, there is very strong growth that is out pacing the growth in academic output as measured by journal articles. Furthermore, recent changes to government policy are encouraging the commercialization of intellectual property at academic institutions. For these reasons it can be expected that the patenting activities of academic institutions, and the associated funding that is created by licensing this intellectual property, will continue to grow in both the short and long term.

References

1. Bayh-Dole University and Small Business Patent Procedures Act of December 12th, 1980; Public Law 96-517
2. Survey Summary; AUTM Licensing Survey: FY 2003; AUTM Survey, Statistics and Metrics Committee
3. O'Shea, Dennis; A 'Paradigm Shift' for Tech Transfer; The JHU Gazette; v34; #20
4. Asian Development Outlook, 2005; People's Republic of China, Macroeconomic Assessment 2004; p65
5. WTO news; WTO successfully concludes negotiations on China's entry; September 2001
6. Xinhua News Agency; Chinese Research Institutes Urged to Be More Patent-aware; May 13, 2003