High-tech Spin-off in China: How and Why

○温　江（電通大情報システム学研）

1. Introduction

High-tech spin-off is widely viewed as a key element in today's economic development. Particularly, university-based research is increasingly leading to business opportunities beyond academia. When mentioning high-tech business, the large and important spin-offs such as Digital Equipment Corporation from MIT in the Route 128 corridor, and Hewlett Packard from Stanford University in Silicon Valley are prominent examples of how significant roles that universities can play. While this issue is widely researched in the developed countries, not many literatures are presented in the developing countries. This paper aims at providing some evidence on some key factors behind the formation of high-tech spin-off, and on the major forms of high-tech spin-off in China, in terms of CAD (Computer-Aided-Design) sector, through extensive literature study and on-site survey.

2. Methodology and Data

This study uses a combination of statistical surveys, which were conducted in the form of questionnaires by phones, faxes, e-mails and multiple case studies, extensively on 1995-2000, and author's long-term involvement by representing a leading U.S. CAD company in China. In parallel to these surveys, on-site interviews of key informants from leading spin-offs, were used as well. This paper therefore can provide relatively thick description required to understand and explain this emerging phenomenon in China.

3. Some Definitions

In general, a spin-off company is defined as one the produces a product or service originating from research a university. In many cases, the faculty member involved in the research will have started the company and may

leave the university to run it, or an outside management team may be formed. In this paper, spin-off refers to CAD companies and originated either by university faculty, or alumni, or by CAS (China Academy of Science).

4. Major Findings

4-1. Market Dynamics: Opportunities and Barriers

With the rapid economic growth, the serious lack of engineering design expertise and CAD usage were identified as the major bottleneck in the country's manufacturing competitiveness. By considering as many as 400,000 enterprises need to use CAD to replace drawing board and 20 copies of CAD necessary for each enterprise in average, the domestic market may soar to 8 millions copies. Under such background, CAD software market in China keeps increasing at some 80% in recent.

On the other hand, barriers, such as the lack of awareness or even the negative attitude on applying CAD in product innovation in the SOE (State-owned-Enterprise)-dominated industrial sector, and the oligopolistic situation of few non-Chinese-made CAD software prevails in the market.

The facts can be interpreted as both opportunities and threats/challenges to the development of Chinese spin-offs.

4-2. Government Regulation/Policy and its Impact

Science and Technology (S&T) policy has been one of the most dynamic instruments of the public sector to promote economic development in most developed countries. In China, the major construction of S&T policy began later than in developed countries, but its active development from 1980s has counterbalanced the late start.

Perhaps no other technology in China is more regulated than the technology of CAD. Government policy impacts this technology through regulations, such as "National High Technology Research and Development Program", "863 Program" and "Super 863 Program", at the level of innovation, and "China Torch Program", at the level of incubation, commercialization and diffusion.

Under such environment, fostering innovative activities in traditional

technologies has been positioned as the one of the major tasks in its economic reform. High-tech companies, spin-offs mostly, have been regarded as an important means for transferring technology from academics to its long-ailing SOEs. It is recently (within the last decade) that academia, universities and CAS, has actively and directly sought to create spin-offs, in the fields such as biotechnology, information and optical technology.

In addition, the legislations construction, such as the enforcement of Technology Transfer Law and intellectual property policy, have now authorized universities, government laboratories, and individual contractors both to own jointly any technology developed under government funding, and to benefit directly from licensing or developing it further. Some benefits flow back to them instead of into the government treasury. Therefore, for the first time, incentives exist to patent and license technology.

Further, the reform on academia, by releasing control on faculty involving commercial activities, and constructing technology transfer mechanism such as equity and management support and technology licensing office (TLO), serve as organizational vehicle to deliver intellectual property.

It is only recently that many universities and individual faculty members have become convinced of the benefits to commercialize the results of university research and development. Faculty attitudes are changing at universities of a variety of sizes and cultural orientations. Increasing interest in commercializing their R&D has led universities to develop new mechanisms that optimize the market potential of their research. The development of university spin-off companies is one such route.

Meanwhile, China has created a supportive environment/system for faculty who want to establish companies, carry out applied research, develop intellectual property, or in other ways participate in the commercialization of the products of their creative energies. Elements of this support system are also available to the general public.

- A university administration that encourages faculty entrepreneurship, and university policies that facilitate it;
- The high-tech zone and innovation incubator—a physical facility where those in the process of business development can maintain an office and a prototype development area in an environment where such activity is the main enterprise; and
- A network of not-for-profit and for-profit advisory services.

4.3. Modes of Spin-off

Under such circumstance, CAD companies were spun-off and can be categorized as major modes.

- Entrepreneur Mode
  --mostly established by either faculty or alumni
  --faculty can be either on-the-job, or former faculty
  --attributed to faculty's expertise for commercialization process
- Institutional Mode
  --managed through organizations (e.g. TTO)
  --established under formal process of commercialization in universities or CAS
- Traditional Mode
  --established between industry and university
  --knowledge sharing between these sectors

5. Concluding Remarks

This paper provides observations on the environment, in terms of S&T policy and facilities such as incubation, created aiming at promoting spin-off in China. The spin-offs have been active and usually created by the alumni or faculty members or researchers applied the knowledge in recent years. This paper also described the principal modes taken by spin-offs.

6. Bibliography (partial)

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