Review Of The Legal Scheme And Practice Of Science & Technology Basic Law In Taiwan: Taiwanese Version Of Bayh-Dole Act

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1. Introduction

Before the 1970s, the U.S. government agencies that owned the patent rights to government-funded research were not allowed to grant exclusive license to private industry, and as a result, private industry gradually lost interest in the technology transferred from government-funded research because these private businesses were reluctant to invest capital into commercialization of such transferred technology without the protection of patent rights or exclusive licenses.[1]

In order to promote cooperation between academic institutions and private industries and strengthen national innovation, research and development, the U.S. government introduced the Bayh-Dole Act in 1980 to promote technology transfer by allowing universities, small businesses, and other research institutions to retain ownership of the patent rights resulting from government-funded research.[2] The Act allocates patent rights to academia rather than to the government. As a result, academia can now profit by receiving royalties from licensing patent rights to private industries for further development and commercialization. Private industry can now utilize patent rights or exclusive licenses from academia with society benefiting due to economic growth stimulated thereby.

To follow the experience of the United States, Taiwan mimicked the system of the Bayh-Dole Act and passed the Science and Technology Basic Law in 1999. As a result, this Law not only generates valuable patents to promote commercial development, but also saves the additional cost of the investment in technology transfer by the government. Ever since the passage of the Law, it has generally been recognized to have positive effects on society as a whole. However, there have been mounting criticisms claiming that this Law corrupts the university's basic mission to educate and conduct research, and there are strong voices arguing that knowledge and research results should be freely and openly disseminated, especially when they are funded by the government.

This study will review the practice and resulting effects of the Science and Technology Basic Law, and furthermore propose several suggestions to maximize the benefits and to minimize the flaws of the Science and Technology Basic Law.

2.The Effects of the Science and Technology Basic Law

Since the Science and Technology Basic Law was announced in Taiwan in January 20, 1999, scholars have been debating the effects generated from implementation of industrial technology transfers from academic institutions to the private sector. In recent years, many studies have been conducted regarding this issue, including "R&D Achievement Management and Popularized Mechanism of Universities and Research Institutions in Taiwan" and "2006 Personnel Forum of Technology Transfer of Academic Institutions" by Prof. Paul C.B. Liu and Prof. Yun Ken in 2006 (thereinafter jointly referred to as 2006 Researches),[3] and interviews guided by Prof. Shiau-Huei Chen in 2007 about technology transfers with the National Taiwan University and other seven academic institutions involved in "National Research Program for Genomic Medicine" (thereinafter referred to as 2007 Researches).[4] We will study and analyze the actual achievements of technology transfer from academic institutions to the private sector ever since the passage of the Science and Technology Basic Law and related regulations based on the abovementioned and more recent research studies.

1. See 35 U.S.C. § 202 (2003).

2. The University and Small Business Patent Procedure Act, commonly known as the Bayh-Dole Act, Pub. L. No. 96-517, 94 Stat. 3015-3028, codified as amended at 35 U.S.C. §§ 200-211, 301-307 (2003).

3. Paul C.B. Liu et al., *The Investment of Technology Transfers in Taiwan*, Symposium Of Academic And Research Institutes Techonology Transfer Designated Personnels Forum (2006)(in Chinese).

4. Chen Shiau-huei, *The Analysis of Current Situation of Biotechnology R&D Achievement Transfer in Taiwan Academia*, Symposium Of R&D, Innovation And Intellectual Property Of Genomic Medicine (2007)(in Chinese).

2.1 Current Status of Technology Licensing Offices

In accordance with 2006 Researches, 63 universities, which constitute about 45 percent of 140 survey respondents out of Taiwan's total 164 universities,[5] have specialized technology licensing offices (TLOs) or personnel responsible for technology transfer affairs. It is a notable success in the establishment of specialized TLOs that nearly half of the academic institutions surveyed have set up the TLO or personnel.[6] Nonetheless, a majority (72 percent) of the directors of TLOs are university professors, instead of professional technology managers. This phenomenon, on the other hand, indicates that most TLOs might not be equipped with enough professional personnel. For a better understanding of this issue, the Organization for Economic Cooperation and Development (OECD) organized a specialized team to thoroughly investigate and analyze the R&D achievement attribution schemes and the current situation of technology transfers within member countries. The 2004 OECD report "Turning Science into Business: Patenting and Licensing at Public Research Organization" also pointed out that a TLO should be equipped with at least 5 staff from various areas to achieve the standard for efficient patent application filing and intellectual property management. However, only a few Taiwanese academic institutions keep up with the OECD standard of at least five staff for a TLO.

2.2 Professionalism and Achievements of TLOs

The educational background of the staff in TLOs consists mainly of science (47.86 percent), management (34.18 percent), and law (11.11 percent), which more or less matches the distribution of these three professionals in U.S. Technology Transfer Offices.[7] Among various TLOs or staff, 84.13 percent are capable of patent application filing, and 77.78 percent are capable of technology licensing, indicating that they could process most of the patent application filings and technology licensing affairs, although only 50.79 percent are able to determine whether a new invention is patentable technology-wise.[8] However, only 14.29 percent of personnel can deal with the establishment of spin off companies and related affairs, because it is too complicated for the personnel of academic TLOs to deal with the related problems of company establishment.

We can also take a closer look on the growth of the number of patent applications filed and approved. From 2003 to 2008, the filed patent applications of research results funded by the National Science Council has increased to 4,734 applications. Approved patent applications reached 1,584, of which 1,117 applications were filed in 1999, making the approval ratio 93.9 percent, significantly higher than the approval rate of 51.9 percent before 1999, when the Science and Technology Law was passed.[9] Additionally, the increase in licensing deals within academic institutions has been phenomenal. The number of licensing deals was only 25 in 1999, increased to 90 in 2003,[10] and skyrocketed to 344 in 2007.[11] Patent licensing made up a majority of all licensing deals. For example, in 2007, there were 312 licensed patents out of a total of 344 licensing deals, accounting for 90 percent, while the remaining technology transfers were insignificantly dispersed across other various types, such as computer programs, copyright and materials transfer, etc.[12]

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5. *See supra* note 3.

6. Take the United States for example, after the passage of the Bayh-Dole Act for about ten years, the establishment of technology transfer offices has become a current trend. *See* Paul C.B Liu *et al.*, "General Principles On Intellectual Property Management," at 299 (2004) (in Chinese).

7. *See* Lita Nelsen, *The Lifeblood of Biotechnology: University-Industry Technology Transfer*, in "The Business Of Biotechnology: From The Bench To The Street," 39-41 (R. Dana Ono ed., 1991).

8. *See* Yun Ken, supra note 1, at 100.

9. *See* Pay-Lin Chen, *The Research of University Technology Transfer-Establish a Managing Model for Technology Transfer Office in Taiwan*, national taipei university department of business administration master thesis, at 45 (2004)(in Chinese).

10. *See* National Science Council, *Science And Technology Yearbook* (2006)(in Chinese).

Cited Jerry G. Fong, *The Study of Improvement and Problems of Diffusion of Innovation in R/D Based on the Current Situation of International Innovation System*, Sci-Tech Policy Review, 2 Colum, at 144 (in Chinese).

11. *See* Scientific & Technological Resources, Information, and Knowledge Exchange, See Table: Technology Transfers cases and Table: Technology Transfers Royalty Income, Scientific & Technological & Resources, Information, and Knowledge Exchange of National Science Council: *https://nscnt12.nsc.gov.tw/ai/AP_TOP.ASP (last visited July 10, 2007).*

12. *Id.* It also indicates that each academic institute overemphasizes patent licensing but ignores the licensing opportunities in other areas. See infra text.

2.3 Income Through TLOs

In addition, according to recent studies from 2008 and 2009,[13] the research team investigated the applied effect of R&D results management and university-industry cooperation in 2008 by surveying 164 universities. These studies indicated that the total R&D costs of these universities in 2008 were 46.325 billion NTD, of which 3.187 billion NTD came from industrial funds, accounting for 6.88 percent of the total R&D costs and also a 0.7 percent growth in comparison with the percentage in 2007.[14]

According to the research report of AUTM, the total R&D expenditure of investigated American universities in fiscal year 2008 was 45.7 billion USD. License income was 2.3 billion USD, 5 percent of R&D expenditure. The total R&D expenditure of colleges in Taiwan was 46.3 billion NTD, and license income was 456 million NTD, 0.98 percent of R&D expenditure.

In addition, the license income has experienced considerable growth. Before the passage of the Science and Technology Basic Law, only 15.6 million NTD came from license income in 1999.[15] In contrast, license income in 2005 was 145 million NTD, and rose to 456 million NTD in 2009. It is noteworthy that license income of academic institutions in Taiwan is still not up to that of academic institutions in the United States after the passage of Bayh-Dole Act.

3. Taiwan's Problems and Suggestions

Despite the growth in numbers of TLOs and the amount of license income, certain problems are still encountered in promoting technology transfers from academic institutions. Some of these are universal problems not only applicable to us. For example, to professors, patent application and technology transfer play a relatively less significant role than academic publications, especially in terms of tenure review, resulting in lack of interest for professors in such matters. Nonetheless, we do encounter other problems arising mainly from flaws in the Science and Technology Basic Law.

13. *See* Paul C.B. Liu *et al*. The Commission Plan of Science and Technology Advisory Group of Executive Yuan, Industrial Manpower Package "Innovation System and Industry-University Linkage" University-Industry Cooperative Effect Investigation in 2008 (in Chinese), and "University-Industry Cooperative Effect Investigation in 2009" (in Chinese).

14. *See supra* note 13, at 197-198 (2009)(in Chinese).

15. *See* Jerry G. Fong, "The Study of Improvement and Problems of Diffusion of Innovation in R/D Based on the Current Situation of International Innovation System," *Sci-Tech Policy Review*, 2 Colum, at 144 (in Chinese).

It is noted that currently, most licenses of research results are non-exclusive while the industries actually demand exclusive licenses or even assignment of research results. As Article 6 of the Science and Technology Basic Law states "the intellectual property rights and results derived from projects in scientific and technological research and development to be subsidized, commissioned, or funded by the government may be conferred, in whole or in part, to the units executing research and development for ownership or licensing for use, and are not subject to the National Property Act;" however, according to the view of the administrative bureau governing the National Property Act, the exemption offered by the aforementioned Article 6 from the National Property Act is limited in its extent, and funded academic institutions are not entitled to the full ownership of the project results. As a result, if funded academic institutions are to license the project results to any private third party, only non-exclusive licenses can usually be granted because of the philosophy that everyone should have access to government-sponsored research. Even in cases of exclusive licenses, the effective period and scope of use, etc., are usually specified.

As above mentioned, the industries actually demand exclusive licenses of research results before investing capital into commercialization of such transferred technology. This problem has affected the commercialization of government-sponsored research and further has had a negative impact on the economic competitiveness of Taiwan.

In addition, the Science and Technology Basic Law and four other related administrative regulations, including the Government Scientific and Technological Research and Development Results Ownership and Utilization Regulations, respectively, drafted by 3 government departments: the Executive Yuan, the Council of Agriculture the Executive Yuan, and the Atomic Energy Council the Executive Yuan), and also the Government-Commissioned/Sponsored Scientific and Technological Research and Development Results Ownership and Utilization Regulations drafted by the Ministry of Economic Affairs and Subordinate Agencies construct a complete legal system for academia-industry technology transfers; however, redundant restrictions of licensing and royalty distribution lead to great limitations in this system. To address the flaws of the Science and Technology Basic Law, some insights and suggestions are proposed as the following.

3.1 Eliminating Non-Exclusive License Preference

First, the author suggests eliminating the restriction on exclusive license in the Science and Technology

Basic Law. As stated, the administrative regulations of the Science and Technology Basic Law preferentially require non-exclusive licensing to contractors. However, most industrial firms request exclusive licenses. Exclusive licenses are often deemed necessary to secure the industrial contractors' investment and market competitiveness. Consequently, the allowance of exclusive licenses may increase licensing flexibility, broaden the technology transfer opportunities in academia-industry cooperation and increase the amount of license income.

3.2 Eliminate License Income Contribution to Funding Agencies

Secondly, in accordance with all the related regulations, funded institutions should contribute 20 percent to 50 percent of all research result-deriving income back to funding agencies, including royalty, license fees and equity, etc.[16] It is suggested that from the experience in the Bayh-Dole Act, funded academic institutions shall only contribute license income to further education and research expenses instead of to funding agencies. This self-beneficial allocation of research result-deriving income will considerably motivate academic institutions to engage in technology transfer and licensing, while the income is used to promote science and technology development.

3.3 Detailed Statutory Instructions and Regulations Regarding March-in Right

Additionally, the Science and Technology Basic Law grants government agencies the "march-in right," which allows the funding agency, on its own initiative or at the request of a third party, to effectively ignore the exclusivity of a patent awarded under the law and grant additional licenses to other "reasonable applicants."[17] This right is strictly limited and can only be exercised if the agency determines, following an investigation, that a failure by the licensed contractor to take "effective steps to achieve practical application of the subject invention" or a failure to satisfy "health and safety needs" of consumers, but mainly to prevent commercial competitors from securing their current markets without further product development and economy facilitation. Nonetheless, the exercise of the march-in right may conflict with the intent of funded academic institutions, and it is unclear whether and how civil or administrative remedies could apply to the affected academic institutions.[18] Therefore, more detailed statutory instructions and regulations shall be specified to prevent disputes and controversies.

3.4 Other Suggestions

According to the OECD standard, every TLO should be equipped with 5 specialized staff members. However, insufficient academic institution funds in Taiwan make it difficult to establish independent TLOs and specialized units in every university, unlike the United States after the passage of the Bayh-Dole Act. The same problem also occurs in other countries, and the Japanese government for example, adopts different technology transfer operations, in which seven outstanding technology licensing organizations (TLO) are promoted as Super TLOs obligated to manage existing technology transfer affairs and provide additional education and consultancy to similar units. Moreover, the British government tries to integrate different medical centers in a neighborhood into one large TLO, and the South Korean government coordinates numerous TLOs within the same industrial field.[19] The author suggests that the operations in Japan and other countries could be duplicated and adjusted accordingly, to use economies of scale to solve general problems of insufficient manpower and funds in every TLO in Taiwan.

4. Conclusion

Since the passage of the Science and Technology Basic Law, observable performance and growth of

16. *See* The Government Scientific and Technological Research and Development Results Ownership and Utilization Regulations §10, the Executive Yuan, and The Government-Commissioned/Sponsored Scientific and Technological Research and Development Results Ownership and Utilization Regulations §24 , the Ministry of Economic Affairs and Subordinate Agencies, The Government Scientific and Technological Research and Development Results Ownership and Utilization Regulations §21, the Atomic Energy Council the Executive Yuan, and The Government Scientific and Technological Research and Development Results Ownership and Utilization Regulations §21, the Council Of Agriculture the Executive Yuan.

17. *See* The Science and Technology Basic Law §6 "Projects in scientific and technological research and development to be subsidized, commissioned, or funded by the government shall be selected through a process of evaluation or review, and the results thereof shall be justified with reasons. The intellectual property rights and results derived from such a project may be conferred, in whole or in part, to the executing research and development units for ownership or licensing for use, and are not subject to the National Property Act."(2005)

18. *See* Wei-Lin Wang, "A Study of the Cooperation between the U.S. Academia and Private Industry—Reference for Taiwan's Science and Technology Basic Act," *Shih Hsin Law Review*, 3 Colum, at 26 (2006)(in Chinese).

19. *See* Jerry G. Fong, "The Study of Improvement and Problems of Diffusion of Innovation in R/D Based on the Current Situation of International Innovation System," *Sci-Tech Policy Review*, 2 Colum, at 142 (in Chinese).

patent applications, technology transfers and license income are satisfactory in comparison with many other countries, although large room for improvement exists owing to the restrictions as set up by the Science and Technology Basic Law. To specifically address numerous restrictions and resulting problems, including conflicts of interest and limitations on diffusion of knowledge, etc., all the suggestions mentioned above may hopefully enhance the legislative system related to the Science and Technology Basic Law and improve the current technology transfer operations between academia-industry cooperation. ■