REVIEW OF THE LEGAL SCHEME AND PRACTICE OF TECHNOLOGY TRANSFER IN TAIWAN

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ABSTRACT

To follow the experience of the United States, Taiwan mimics the system of the Bayh-Dole Act and passed the Fundamental Science and Technology Act in 1999; from then this Act has been implemented for around 12 years. As a result, this Law not only generates valuable patents to promote commercial development, but also saves the additional cost on the investment of technology transfer for the government. Ever since the passage of this Act, it has been generally recognized to have positive effects on the society as a whole. This article reviews the practice and resulting effects of the Fundamental Science and Technology Act, compared with performance of other countries, and furthermore propose several suggestions to the current status of the practical implementation to maximize the benefits and to minimize the flaws of the Fundamental Science and Technology Act. The key policy recommendations include: eliminating non-exclusive license preference, eliminating license income contribution to funding agencies, detailing statutory instructions and regulations regarding march-in right, and preventing from conflicts of interest.

Keywords: Technology transfer, university, patent, Bayh-Dole Act, Fundamental Science and Technology Act

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I. Introduction

Before the 1970s, the U.S. government agencies that owned 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 license.[1]

In order to promote the 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, the 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 the entire society benefiting due to economic growth stimulated thereby.

To follow the experience of the United States, Taiwan mimics the system of the Bayh-Dole Act and passed the Fundamental Science and Technology Act in 1999; from then this Act has been implemented for around 12 years. As a result, this Law not only generates valuable patents to promote commercial development, but also saves the additional cost on the investment of technology transfer for the government. Ever since the passage of this Act, it has been generally recognized to have positive effects on the society as a whole. However, there have been mounting criticisms claiming that this Law corrupts the university's basic missions to educate and conduct research, and there are strong voices contesting that knowledge and research results should be freely and openly disseminated, especially when they are funded by the government using the money from the public.

In response to the aforementioned criticism and to expand the effects of the Fundamental Science and Technology Act, Taiwan's Legislative Yuan amended such Law in 2011. Nonetheless, a few defects still remains in the new Amendment, which are worthy of further discussion by academia. This study will, in the first place, review the practice and resulting effects of the Fundamental Science and Technology Act, compared with performance of

[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).

other countries, and furthermore propose several suggestions to the current status of the practical implementation to maximize the benefits and to minimize the flaws of the Fundamental Science and Technology Act.

II. Practice of Technology Transfer in Major Countries

It is widely held that the Bayh-Dole Act has spurred universities to become involved in transfer of technology from their laboratories to the marketplace. Considerable interest in emulating the Bayh-Dole Act was seen in a number of OECD governments. In Japan and many Western European countries, policies emulating the Bayh-Dole Act are in place; and Japan has the most radical reform among other countries.[3] The following subchapter will explore the practice in such countries for a better understanding of Taiwan's situation.

A. Japan

The Japanese Bayh-Dole Act, the Facilitation Act of Technology Transfer for Universities and Research Institutes (FATTURI hereinafter), was established by MEXT (Ministry of Education, Science and Technology) and METI (Ministry of Economy, Trade and Industry) in 1988. The law also mandated the shifting the ownership of government-funded research from government to universities.[4]

Under the FATTURI, while it was possible for the TTOs (Technology Transfer Office) to reside in the private university campuses such as the cases in Waseda University and Keio University, profit-making TTOs were not allowed to reside in the campuses of national universities, as in the cases of Tokyo University and Tohoku University.[5] Many TTOs were therefore established outside of campus as independent entities. In addition, according to Japanese Law, however, national universities have no status as legal entities, so they will encounter difficulties when promoting technology transfer. Concerning the problem, the "Basic Law for Intellectual Properties" and other related policies were further established in 2002. Under the Basic Law for Intellectual Properties, congress mandated that government take necessary steps to encourage commercial dissemination of research. Then in 2003, the Japanese Congress further promulgated the "Law for National

[3] PAUL CHANG-BIN LIU ET AL., GENERAL PRINCIPLES ON INTELLECTUAL PROPERTY MANAGEMENT 229 (2004) (in Chinese).

[4] *Id.*

[5] Jerry G. Fong, *Lessons Learned from International Innovation System: What Taiwan Can Learn and Do for Its Innovation System*, 2 SCIENCE AND TECHNOLOGY POLICY 132, 136 (2005) (in Chinese).

Universities as Legal Entities", which endow the legal-entity status with national universities.

With the law in place, universities were endowed with the status of independent entities, and were able to join research conducted by different government agencies and enjoyed multi resources of government funding from different agencies.[6] In addition, the law that prohibited civil servants from holding two jobs at a time no longer shackled faculties in universities.[7] The environment was in many ways friendlier to technology transfer.

C. Germany and other European countries

In German, academic institutions were generally seen as a pure vehicle for knowledge creation. However, their role was somewhat eclipsed by their U.S. counterparts after the congress passed the Bayh-Dole Act in the U.S. Consequently, an amendment of "Higher Education Outline", which encouraged universities to engage in more technology transfer activities, was made in 1998. TTOs within the institution could now take on more of the functions that had been delegated otherwise. Further amendments include the reform of a section of German Employee Invention Law in 2002, dealing with inventions by teaching faculty at universities. After February 2002, faculties in German universities were required to report inventions to the academic institutes. The institutes could now claim ownership of the patent rights generated by their faculty, while the faculty-inventors were entitled to some part of the revenue generated from the patents. It was hoped that the reform would assist universities in the dissemination of the research findings.[8]

Germany aside, other European countries have also devoted themselves to the facilitation of technology transfer to the industry by encouraging close interaction between academia and industry through facilitating the setup of university spin-off companies and R&D centers.[9] Take Sweden for example. In the 1998 Community Innovation Policies Address, VINNOVA (Sweden Agency for Innovation System) hoped that the improved innovation system policies would create sustainable growth in Sweden.

The Community Innovation Policies in Sweden was largely manifested through the Competence Center Program, which facilitated collaborations

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[6] *Id*. at 136-137.

[7] *See* Li-Jiuan Chen, *The Institutional Issues for the Commercialization of the Public Universities' R&D Results*, 26 (Oct.) NEWSLETTERS ON RESEARCH IN BIOTECHNOLOGY AND LAW [SHENG-WU KE-JI YU FA-LU YAN-JIU TONG-XUN] 18, 21 (2008) (in Chinese), *available at* http://bio-law.blog.ntu.edu.tw/files/2010/01/問題與研究一.pdf.

[8] *See id*. at 28-29.

[9] Wen-Chi Hung, *Comparative Study of Technology Transfer Practices in Europe, the U.S and Japan*, 2 SCIENCE AND TECHNOLOGY POLICY 151, 161 (2005) (in Chinese).

among industry, academia and government. 28 Competence Centers were set up in eight universities where research were conducted in various discipline, including energy, transportation, environment, manufacturing, biology, biomedical technology, and information technology. Enterprises involved in the Competence Center Program would have the priority to negotiate the licensing deals from the center. Currently, more than 200 enterprises have collaborated or involved in the Competence Center Program.[10]

D. Comparison of Technology Transfer Performance between Major Countries

1. Overview

In addition to the aforementioned Japan and German, a number of Organization for Economic Cooperation and Development (OECD) countries have also emulated Bayh-Dole Act to set up TTOs in and outside the campus, giving academic institutions title to government-funded research, and raising the ceiling on time limit for faculties in universities. However, it remains unclear whether there is a practical benefit despite the emulation. A working group under OECD was therefore set up to shed some light on the issue. The working group evaluated the results of technology transfer in academia among member countries and published the results report, *Turning Science into Business: Patenting and Licensing at Public Research Organization* (hereinafter refer to as the OECD report[11]), in 2004. The report suggested that the then-current outcomes from technology transfer activities were not significant despite the effort, and so there is room for improvement by member countries. The OECD report can be broken down into the following parts.

2. TTO (Technology Transfer Office) in Operation[12]

In most countries, most transfer technology offices were set up in less than a decade. In Italy, 40% of the universities had the TTOs established between the year 2000 and 2001. As for the number of personnel, most TTOs have less than five technology transfer officers. In Norway, only one fifth of the TTOs have more than one technology transfer officers; in Germany, the problem of technology transfer officer shortage also plagues many university TTOs. In most of the cases, administrative faculties take the place of licensing professionals to run TTOs. But shortage of TT-officers is

[10] *Id.*

[11] *See* Fong, *supra* note 5, at 138.

[12] ORG. FOR ECON. CO-OPERATION AND DEV. [OECD], TURNING SCIENCE INTO BUSINESS: PATENTING AND LICENSING AT PUBLIC RESEARCH ORGANIZATIONS 37-39 (2003); *see also* Fong, *supra* note 5, at 140.

not a problem in the U.S. Most universities in the U.S have on average 7 technology transfer officers in their TTOs.[13]

In addition to personnel shortage, most TTOs also have problems with maintaining industry contacts. A majority of networks between enterprises and professors are formed through seminars and other private connections, without the involvement of TTOs.[14]

Moreover, the fact that industry-oriented research is not the principal focus of most universities also explains the limited number of patents filed. The average number of patent prosecution in a TTO is below 50; 20-30% of the TTOs do not have at least one granted patent in a year.[15] Nonetheless, most TTOs did give priorities to small enterprises and new ventures when making license agreement; more licenses were granted to small and medium enterprises rather than to large enterprises.[16] As for the number of technology licenses, two third of the TTOs have less than ten contract deals a year. The remaining one third of the TTOs has slightly more contracts signed, with an average of 14.7 license agreements in TTOs in Holland, 19.1 in Germany, and 24.1 in the U.S.[17]

3. Royalties and other Benefits

Approximately 20% to 40% of the patents owned by academic institutes would be licensed to industry sectors. Among the licensed patents, about half of which can generate royalty fee.[18] One benchmark to gauge the performance of technology transfer is the number of spin-offs being set up. To most academic institutes, setting up one spinoff a year is by no means easy. Germany, for example, has no more than 1.12 university-based

[13] 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).

[14] According to the research by Jansen and Dilution in 1999, inventors themselves were the deciding factor in successful technology transfers. Approximately 56% of the licensing cases were run solely by inventors, whereas only 19% of the cases were assisted by TTOs within the universities. Another survey on technology transfer directors conducted by Thursby in 2000 draws similar conclusion. *See* Fong, *supra* note 5, at 137-138. Private enterprises would contact the inventors directly through seminars and other private connections. TTO was not a platform where people generally network. *See* Kenneth Sutherlin Dueker, *Biobusiness on Campus: Commercialization of University-Developed Biomedical Technologies*, 52 FOOD & DRUG L.J. 453, 466 (1997).

[15] The average number of patents prosecuted is 22 in a single TTO; only TTO in the U.S. has more than 22 patents filed. *See* OECD, s*upra* note 12, at 51; *see also* Fong, *supra* note 5, at 140.

[16] *See* OECD, *supra* note 12, at 66; *see also* Fong, *supra* note 5, at 140.

[17] *See* OECD, *supra* note 12, at 60-61; *see also* Fong, *supra* note 5, at 141.

[18] *See* OECD, *supra* note 12, at 68-73; *see also* Fong, *supra* note 5, at 141.

spin-offs a year; Japan sees a mere 0.1 university-based spin-offs annually. Only U.S. and Korea perform better, with two spin-offs being set up by universities or academic institutes every year.[19]

Despite the effort to emulate the Bayh-Dole Act, many countries find the technology transfer policy fell short of initial expectations. Although Bayh-Dole Act encourages technology transfer to industry sectors by shifting ownership of patents to academic institutes, moving technology to public domain remains a convoluting exercise. A number of conditions are required to have a successful technology transfer.[20]

Outstanding performance of technology transfer in U.S. TTOs can be summarized into a few reasons; the top three reasons are: early implementation of Bayh-Dole Act, larger scale of applied-oriented research, healthy competition and entrepreneurship, which are not inherent in academia outside the U.S.[21] There is no foolproof way to have a successful technology transfer; strategic measures must be in place to have an effective framework for technology transfer between academia and private enterprises.

III. Taiwan's Performance

A. Overview

Since the Fundamental Science and Technology Act was announced in Taiwan in January 20, 1999, scholars have been discussing the effects generated from implementation of industrial technology transfers from academic institutions towards private sectors. Researches have been conducted regarding this issue, and major studies include "R&D Achievement Management and Popularized Mechanism of Universities and Research Institutions in Taiwan" and "2006 Personnel Forum of Technology

[19] *See* OECD, *supra* note 12, at 58; *see also* Fong, *supra* note 5, at 141. A spin-off is a company founded on the findings of a member or by members of a research group at a university that will have the goal to transfer technology developed in the laboratory. In most cases, the principal investigator would be in charge of consultative and administrative activities for further product development. Conflicts of interest can arise out of a surging of revenue from a successful product. Professors and researchers may easily sacrifice teaching for to their devotion to the spin-offs. General principles on conflict of interests are thereby proposed in most universities in the U.S. that members of the academic community should conduct their affairs so as to avoid or minimize conflicts of interest, and must respond appropriately when apparent conflicts of interest arise. *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*, 3 SHIH HSHIN L. REV. 1, 14-22 (2006) (in Chinese).

[20] *See generally* Laura G. Lape, *A Narrow View of Creative Cooperation: The Current State of Joint Work Doctrine*, 61 ALB. L. REV. 43 (1997).

[21] *See* Fong, *supra* note 5, at 146 (citing David C. Mowery & Bhaven N. Sampat, *Patenting and Licensing University Inventions: Lessons from the History of the Research Corporation*, 10 INDUS. & CORP. CHANGE 317-55 (2001)).

Transfer of Academic Institutions" by Prof. Paul C.B. Liu and Prof. Yun Ken in 2006 (thereinafter jointly referred to as 2006 Researches),[22] 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).[23] In addition to scholar's studies, Taiwan government did some surveys regarding the effects of academia and industry cooperation in the past several years. The author will study and analyze the actual achievements of technology transfer from academic institutions towards private sectors ever since the passage of the Fundamental Science and Technology Act and related regulations based on the abovementioned and more recent researches.

In accordance with 2006 Researches, 63 universities, which constitute about 45% of 140 survey respondents out of Taiwan's total 164 universities,[24] have specialized technology licensing offices (TLOs) or personnel to be responsible for technology transfer affairs. It is a notable success that nearly half of the academic institutions surveyed have set up the TLO or personnel.[25] Nonetheless, a majority (72%) of the directors of TLOs are appointed to 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 better understanding of this issue, in the aforementioned 2004 OECD report, OECD also pointed out that a TLO should be equipped with at least 5 staffs from various areas to achieve the standard for efficient patent application filing and the intellectual property management. However, only few Taiwan academic institutions keep up with the OECD standard – at least 5 staffs for a TLO.

This phenomenon has partially improved recently. Until 2010, 7 out of 31 best Taiwan's academic TLOs have more than 5 full-time staffs, while the

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[22] *See* Paul C.B. Liu et al., *The Investment of Technology Transfers in Taiwan*, *in* SYMPOSIUM OF ACADEMIC AND RESEARCH INSTITUTES TECHNOLOGY TRANSFER DESIGNATED PERSONNEL FORUM (2006) (in Chinese).

[23] *See* Shiau-Huei Chen, *The Analysis of Current Situation of Biotechnology R&D Achievement Transfer in Taiwan Academia*, *in* SYMPOSIUM OF R&D, INNOVATION AND INTELLECTUAL PROPERTY OF GENOMIC MEDICINE (2007) (in Chinese).

[24] *See* Yun Ken, *The Investigation of Technology Transfers in Taiwan*, *in* SYMPOSIUM OF ACADEMIC AND RESEARCH INSTITUTES TECHNOLOGY TRANSFER DESIGNATED PERSONNEL FORUM 95 (2006) (in Chinese).

[25] 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* LIU ET AL., *supra* note 3, at 299.

remaining 24 (approximately 77%) still comprise 5 or less staffs.[26]

B. Professionalization and Achievements of TLOs

The education background of the staffs in TLOs mainly lies in the field of science (47.86%), management (34.18%), or laws (11.11%), which more or less meets the requirements of the three necessary professionals of U.S. Technology Transfer offices.[27] Among various TLOs or staffs, 84.13% is capable of patent application filing, and 77.78% capable of technology licensing, indicating that they could process most of the patent application filing and technology licensing affairs, although only 50.79% is able to determine whether such new invention is patentable technology-wise.[28] Since it is too complicated for academic TLOs personnel to deal with company establishing problems, only 14.29% of the TLOs staffs have the capability to advise in the establishment of spinoff company and related affairs.

Moreover, we can also take a closer look at 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 had increased to 4,734, and approved patent applications achieved 1,584. Among them, there were 1,117 applications filed in 1999, making the approval ratio to be 93.9%, significantly more mature than the approval rate of 51.9% before 1999, when the Fundamental Science and Technology Act was passed.[29] Additionally, the increase in licensing deals within academic institutions has been phenomenal. The number of licensing deals was only 25 in 1999, increased to 924 in 2011,[30] with a historical high number of 1244 in 2007.[31] The patent licensing took a majority of all licensing deals. For example, in 2007, there were 312 licensed patents out of total 344 licensing

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[26] *See* Huei-Jen Su, *The Strategy to Promote IP Management in University*, in THE 30TH CONFERENCE OF SCIENCE AND TECHNOLOGY ADVISORY GROUP OF EXECUTIVE YUAN, *available at* http://www.bost.ey.gov.tw/Upload/UserFiles/%E8%AD%B0%E9%A1%8C%E4%B8%80%EF%BC%9A1.2%E5%A4%A7%E5%B0%88%E6%A0%A1%E9%99%A2%E6%99%BA%E8%B2%A1%E7%87%9F%E9%81%8B%E7%B6%AD%E6%96%B0%E7%AD%96%E7%95%A5%20.pdf (last visited Nov. 14, 2012).

[27] *See* Nelsen, *supra* note 13, at 39-41.

[28] *See* Ken, *supra* note 24, at 100.

[29] *See* PAY-LIN CHEN, THE RESEARCH OF UNIVERSITY TECHNOLOGY TRANSFER-ESTABLISH A MANAGING MODEL FOR TECHNOLOGY TRANSFER OFFICE IN TAIWAN 45 (Master Thesis, National Taipei University, Department of Business Administration 2004) (in Chinese).

[30] *See* NATIONAL SCIENCE COUNCIL, EXECUTIVE YUAN, 2011 NATIONAL SCIENCE COUNCIL REVIEW 75 (2012) (Chinese).

[31] *See id.*

deals, accounting for 90%, while the rest of technology transfers were insignificantly dispersed in other various types, such as computer program, copyright and material transfer, etc.[32]

In addition, according to recent researches of 2008 and 2009,[33] the research team investigated into the applied effect of R&D results management and university-industry cooperation in 2008 by surveying 164 universities. It indicated that the total R&D costs of these universities in 2008 are 46.325 billion NTD, of which 3.187 billion NTD come from industrial funds, accounting for 6.88% of the total R&D costs and also a 0.7% growth in comparison with the percentage in 2007.[34]

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, accounting for 5% of the R&D expenditure; the total R&D expenditure of colleges in Taiwan was 46.3 billion NTD, and license income was 456 million NTD, accounting for 0.98% of the R&D expenditure.

In addition, the license income also has considerable growth. Before the passage of the Fundamental Science and Technology Act, only 15.6 million NTD came from license income in 1999.[35] In contrast, the license income in 2005 was 145 million NTD, and rose to 456 million NTD in 2009. It is noteworthy that the license income of academic institutions in Taiwan is still unparalleled with that of academic institutions in the United States after the passage of Bayh-Dole Act.

C. Taiwan's Problems and Suggestions

1. Overview

Despite the growth in numbers of TLOs and amount of license income, certain problems are still encountered in promoting technology transfers

[32] *See* Scientific& Technological Resources, Information, and Knowledge Exchange, 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 Nov. 14, 2012). It also indicates that each academic institute overemphasizes patent licensing but ignores the licensing opportunities in other areas. *See infra* text.

[33] *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).

[34] *See* PAUL C.B. LIU ET AL., UNIVERSITY-INDUSTRY COOPERATIVE EFFECT INVESTIGATION IN 2009 197-198 (2009).

[35] *See* Fong, *supra* note 5, at 144.

from academic institutions. Some of them are universal problems not only applied to us. For example, to professors, patent application and technology transfer play relatively insignificant 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 the flaw of the Fundamental Science and Technology Act.

It is noted that currently, most of the 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 Fundamental Science and Technology Act 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 any funded academic institutions are to license the project results to any private third party, only non-exclusive licenses can be usually granted because of the philosophy that everyone should have the access to government-sponsored research. Even the in case of exclusive licenses, the effective period and scope of use, etc. are usually specified.

As abovementioned, the industries actually demand exclusive licenses of research results to invest capital into commercialization of such transferred technology with the protection of exclusive license. This problem affected the commercialization of government-sponsored research and further posed negative impact on the economic competitiveness of Taiwan.

In addition, the Fundamental Science and Technology Act and eight other related administrative regulations, including the Government Scientific and Technological Research and Development Results Ownership and Utilization Regulations respectively drafted by seven government departments: the Executive Yuan,[36] the Council of Agriculture,[37] the Atomic Energy

[36] Government Scientific and Technological Research and Development Results Ownership and Utilization Regulations [政府科學技術研究發展成果歸屬及運用辦法].

[37] Scientific and Technological Research and Development Results Ownership and Utilization Regulations of the Council Of Agriculture of the Executive Yuan [行政院農業委員會科學技術研究發展成果歸屬及運用辦法].

Council,[38] the Ministry of National Defense,[39] the Commission of Labor Affairs,[40] the Department of Health,[41] the National Science Council,[42] 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[43] (the "MOE Regulation" hereinafter) 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 those flaws, the Legislative Yuan amended the Fundamental Science and Technology Act at the end of 2011, to give academia institutes more room in the acquisition, management, utilization, disposition and revenue accrued from the sponsored research results.[44] The Act was also amended to allow researchers to acquire more than a 10 percent stake in a company when using technology as investment capital to such company, and to double as a member of a board of directors or supervisors at a company.[45]

Nonetheless, certain hurdles remain unmoved. In the author's point of view, the current amendment did very little in response to the criticisms of the old version of the Act, and further amendments are thus still necessary to be made in further amendments or in the 8 regulations of the Act. Hence, some insights and suggestions are proposed as the following.

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[38] Scientific and Technological Research and Development Results Ownership and Utilization Regulations of the Atomic Energy Council of the Executive Yuan [行政院原子能委員會科學技術研究發展成果歸屬及運用辦法].

[39] Scientific and Technological Research and Development Results Ownership and Utilization Regulations of the Ministry of National Defense [國防部科學技術研究發展成果歸屬及運用辦法].

[40] Scientific and Technological Research and Development Results Ownership and Utilization Regulations of the Council of Labor Affairs of Executive Yuan [行政院勞工委員會科學技術研究發展成果歸屬及運用辦法].

[41] Scientific and Technological Research and Development Results Ownership and Utilization Regulations of the Department of Health and Subordinate Agencies of Executive Yuan [行政院衛生署及所屬機關科學技術研究發展成果歸屬及運用辦法].

[42] Scientific and Technological Research and Development Results Ownership and Utilization Regulations of the National Science Council of Executive Yuan [行政院國家科學委員會科學技術研究發展成果歸屬及運用辦法].

[43] The Government-Commissioned/Sponsored Scientific and Technological Research and Development Results Ownership and Utilization Regulations of the Ministry of Economic Affairs [經濟部科學技術研究發展成果歸屬及運用辦法].

[44] *See* Fundamental Science and Technology Act § 6.

[45] *See* Fundamental Science and Technology Act § 17. With regard to news report about this amendment, please *see* Shih Hsiu-Chuan, *Patent Regulations Eased to Try to Halt 'Brain Drain'*, http://www.taipeitimes.com/News/taiwan/archives/2011/11/26/2003519267. (last visited 2012/10/28).

2. Eliminating Non-Exclusive License Preference

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

In this regard, the MOE regulation did a good job. It just stated that technology transfer from academia to the industry shall be for consideration and the procedure shall open to the public, without restricting the type of exclusive or nonexclusive licensing at all.[46] Obviously, the authority in charge of economic development of our country has noticed and realized the importance of exclusive license, which should be a role model for other agencies.

3. Eliminating License Income Contribution to Funding Agencies

Secondly, in accordance with all the related regulations, funded institutions should contribute 20% to 50% of all research result derived income back to funding agencies, including royalty, license fee and equity, etc.[47] It is suggested that, from the experience in the Bayh-Dole Act, funded academic institutions shall only contribute license income to further education and researches expenses rather than 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 are used to promote science and technology development.

It seems that the government agencies also notice the existence of income contribution will hinder the willingness of academia institutes to

[46] *See* MOE Regulation § 15.

[47] *See* Government Scientific and Technological Research and Development Results Ownership and Utilization Regulations § 10; Government-Commissioned/Sponsored Scientific and Technological Research and Development Results Ownership and Utilization Regulations Scientific and Technological Research and Development Results Ownership and Utilization Regulations of the Ministry of Economic Affairs of Executive Yuan § 24; Scientific and Technological Research and Development Results Ownership and Utilization Regulations of the Atomic Energy Council of Executive Yuan § 21; Government Scientific and Technological Research and Development Results Ownership and Utilization Regulations of the Council Of Agriculture of the Executive Yuan § 21.

promote technology transfer; therefore, some agencies recently amend their regulations to decrease the percentage of income contribution to the funding agency. For example, the Executive Yuan recently amended Article 10 of its "Government Scientific and Technological Research and Development Results Ownership and Utilization Regulations" on June 11, 2012, to decrease the percentage of income contribution from 50% to 40%.[48] Nonetheless, the 40% contribution still looks too high, and further reduction is recommended.

4. Detailing Statutory Instructions and Regulations regarding March-in Right

Additionally, the Fundamental Science and Technology Act 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 an exclusive patent license under the law and grant additional licenses to other "reasonable applicants."[49] This right is strictly limited and can be exercised only 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 and secure its current market 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 remedy could apply to the affected academic institutions.[50] Therefore, more detailed statutory instructions and regulations shall be specified accordingly to prevent disputes and controversies.

5. Preventing from Conflicts of Interest

In the United States, there is a debate that because the Bayh-Dole Act encourages cooperation and interaction between academia and private industry, the university-industry relationship will create the problem of

[48] *See* Government Scientific and Technological Research and Development Results Ownership and Utilization Regulations § 10.

[49] *See* Fundamental Science and Technology Act § 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."

[50] *See* Wang, *supra* note 19, at 26.

conflicts of interest and thus undercuts the primary mission of academia: research and education.[51] It is undeniable that after the passage of the Bayh-Dole Act, the academic-industry relationship has influenced some researchers. Sometimes even the professional judgment of some researchers might be so unduly influenced by their private interests as to cause them not to perform their official responsibilities in a professional manner.

In 2010, a top scientist, Chen Yuan-tsong, at the Academia Sinica is embroiled in a scandal. Prosecutors accuse of illegally transferring state-funded research to a company run by his wife.[52] Although prosecutors did not indict him at the end, this case exposed the danger of conflicts of interest arising out of the interaction between academia and industry.

Legislators noticed this problem and requests the Executive Yuan as well as each competent authority shall arrange "recusal and disclosure of relevant information" in the amendment of Fundamental Science and Technology Act this time.[53] Nonetheless, as discussed before, the way that each competent authority implements its own regulation will further complicate the situation. Moreover, lots of different administrative regulations will hinder the development of academia-industry relationship. In the author's point of view, conflicts of interest shall be governed by each academic institution, namely by academia's self-regulation, as the institution itself will better understand its situation than the government agency who are far away from daily practice of academia-industry relationship. The author believes that the Executive Yuan and the three authorities concerning academia-industry relationship, Ministry of Education, Ministry of Economic Affairs, and National Science Council, shall bring the attention of each university and research institutes to the importance of conflicts of interest, while leaving the

[51] *See* COUNCIL ON GOVERNMENTAL RELATIONS, TECHNOLOGY TRANSFER IN U.S. RESEARCH UNIVERSITIES: DISPELLING COMMON MYTHS 2 (2000), *available at* http://www.wvu.edu/~research/techtransfer/news/myths_of_tech_transfer.pdf (last visited Nov. 14, 2012).

[52] Chen Yuan-Tsong is the director of Academia Sinica's Institute of Biomedical Science and is largely credited as the person who found the cure for Pompe disease. Chen was embroiled in charges involving National Science Council funded research and the transfer of drug technology to a company run by his wife. Prosecutors, in the first instance, believed that Chen earned NT$15 million in illicit profits, but confirmed later that Academia Sinica's technology-transfer process followed official bidding protocol, and thus no illegal profits was involved. *See Chen Yuan-Tsong Accused of Illegally Profiting from Drug Technology Transfer*, FORMOSA ENGLISH NEWS, June 23, 2010, http://englishnews.ftv.com.tw/read.aspx?sno=8B0B10DBE89AC6E16A17CBEE114EA0C4 (last visited Nov. 14, 2012).

[53] *See* Fundamental Science and Technology Act § 6.

autonomy in the hands of each institutes, and allowing them to establish their own tailor-made regulations.[54]

6. Other Suggestions

According to the OECD standard, every TLO should be equipped with 5 specialized staffs. However, insufficient academic institution funding in Taiwan make it difficult to establish independent TLOs and specialized units in every university, unlike the situation of 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 operation, in which 7 outstanding technology licensing organizations (TLO) are promoted as Super TLO obligated to existing technology transfer affairs and 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 of the same industrial field.[55] The author suggests 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.

IV. Conclusion

Since the passage of the Fundamental Science and Technology Act, observable performance and growth of patent applications, technology transfers and license income are satisfactory in comparison with many other countries, although large room for improvement do exist owing to some inappropriate restrictions set up by the Fundamental Science and Technology Act. Although the Fundamental Science and Technology Act has been amended to further loosen restrictions and complete legal framework, certain problems still remain unsolved. To specifically address numerous restrictions and resulting problems, all the suggestions mentioned above may hopefully enhance the legislative system related to the Fundamental Science and Technology Act, and improve the current technology transfer operations between academia-industry cooperation.

Cited as:
Bluebook Style: Wei-Lin Wang, *Review of the Legal Scheme and Practice of*

[54] For further discussion, please *see* Wei-Lin Wang, *A Study on Conflicts of Interest in Academia-Industry Co-Operation: The Defense for and Modification to the Bayh-Dole Act Part 1 & Part 2*, EUROPEAN INTELLECTUAL PROPERTY REVIEW (forthcoming on Dec. 2012 and Jan. 2013, respectively).

[55] *See* Fong, *supra* note 5, at 142.

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