

Transplantation of Bayh-Dole System of Academic Patents to EU

Jihong He

Intellectual Property Institute of Chongqing , Chongqing university of technology, No. 69 Hongguang Avenue, Banan District, Chongqing, 400054, China

ABSTRACT

We provide a brief historical overview of the transplantation of Bayh-Dole system to European countries, where formerly adopted the Professor's Privilege system. Then, the authors analyze the reasons for the ineffectiveness or negative result of these reforms as well as the internal drawbacks of Bayh-Dole system. In order to fairly evaluate the effect of Bayh-Dole Act, the authors also briefly overview the changes in the policy on patent originated from public funded university research in U.S from early 20th century to new millennium. Finally, we suggests that Inventor-ownership supplemented with third-party technology transfer office could resolve these issues.

KEYWORDS

Bayh-Dole; Professor's Privilege; Technology transfer office

In December 2002, the normally poker-faced Weekly *The Economist* extolled Bayh-Dole Act as the “most inspired piece of legislation over the past half-century”, because it “unlocked all the inventions and discoveries that had been made in laboratories throughout the United States with the help of taxpayers’ money”, and thus it is “this single policy measure helped to reverse America’s precipitous slide into industrial irrelevance”. However, in the past decade a dozen of published articles have questioned whether the Bayh-Dole Act has in reality been a decisive factor in improving the transfer of technology from US universities, as has been credited to it. These criticisms originated partially from the waning of the effect of Bayh-Dole Act inside U.S, and partially lied in the failure of the transplantation of Bayh-Dole system to some other countries.

1 The origin of U.S Bayh-Dole Act

As demonstrated above, It’s crystal clear that Bayh-Dole system is far from perfect. The question was that whether Bayh-Dole act truly promoted transfer of technology from US universities, as plenty of scholars, journalists and officeholders credited to it. Without understanding the historical background for Bayh-Dole Act enactment as well as the origin and formation of Bayh-Dole Act, it would be too indiscreet to come to a conclusion.

Before World War II patent activities were not frequent on American campus. From the government level to university level, most adopted laissez-faire attitude towards the intellectual property management. Without previously signed agreements clearly stating the patent ownership in advance , the inventor can freely choose whether or not to apply for patent, and after patent granted, the inventor could retain the patent, or could assign the patent right to enterprises, universities and third-party agency. The discussion inside U.S government at that time was mainly focused on whether the universities taking teaching and research as traditional missions should

allow and encourage patenting activities. Opinion supporting the patenting of the academic research outcome prevailed. The main argument is to protect the public interest and to prevent the research findings from being pocketed by someone else, that is reaping monopoly profits from the public by means of patenting. In other words, patenting on government-funded research outcome is to stop others applying for patent and thus obtaining exclusive rights, instead of preventing others from exploiting the patented technology for exclusive implementation.

After World War II, especially from the late 1950s, U.S Federal government dramatically increased funding to scientific research at universities, particularly in the field of fundamental research. In the decade from 1958 to 1968, the amount of U.S Federal government's funding to scientific research at universities has grown by 7 times. In 1979, United States Department of Health and Education Welfare (HEW) alone shouldered over half of all academic research funding in U.S. With skyrocketed expenditure on scientific research from U. S federal government, patent right generated from outcomes of public funded research becomes a hot issue and the focus is still on how to protect public interests. There were mainly two opinions: one is that "the sponsors should own the patent rights and should benefit from the patented scientific outcomes; in other words, in order to protect rights of sponsors, the tax payers, where government tax revenues come from, are entitled to benefit from outcomes of scientific researches funded by government. So patent rights of scientific research outcomes should be possessed by government and government enables patented technologies enter into public domain by granting non-exclusive licenses. The other opinion is against government to own patent rights, arguing that government agencies lack resource and incentives to manage patents or that government ownership of patent rights could breed rent-seeking behaviors, which lead to favoritism toward particular private firms at expense of public. And thus the patent rights should be assigned to contractors of government funded scientific research projects, namely universities, companies and other institutes that conduct scientific research, but in consideration of public benefits, government would be granted with free non-exclusive licenses if needed[5]. Due to the lack of uniform legislation, different government agencies had adopted their own policy on patent management from the end of World War II to the late 1950s.

The majority of governmental agencies prefer the first plan in which patent right is owned by governmental agencies. Some other agencies adopt a compromised plan in which universities are allowed to retain patent right, but are prohibited to grant exclusive licenses to a third-parties. In general speaking, most of the government sponsoring agencies were reluctant to allow any party in private sector to hold an exclusive license. The main concern is that royalties under government sponsored patented technologies maybe thought of as a form of tax imposed on users of these technologies that the public has already paid for through tax dollars, which results in "double taxation". This statement is actually specious. Based on the social contract theory, one can deem that there is a contract between individuals and government. The public pay tax in return for security, welfare and public goods that provided by government. The authority of the assignment of the public funds and the utilization of the research outcome to benefit the public lays in the hands of the government. Since taxpayers have never directly enter into contracts with universities for government funded research, these research outcomes are not necessarily the compensation for their tax dollars. Therefore, the wording of "double taxation" is itself fallacious.

Under such institutional arrangements, although high-minded and well-meaning, it would be not at all surprising that the transfer of technology in U. S is hindered substantially. First of all, governmental agencies are not profit-making entities. It is hard to effectively commercialize the intellectual properties without market incentives. What's more, typically, government agencies only grant non-exclusive patent licenses or prohibit universities to grant exclusive patent licenses. Provided that the company that first implements the patented technology develops a new product that cater market needs by investing a large sum of capitals and shouldering the risk of failure,

without the protection from exclusive patent licenses the competitors can implement the patented technology and produce similar products through non-exclusive patent licenses without investing the same amount of capitals or shouldering the same risk. This leads to "free rider problem". From the investor's perspective, the latent risks of investment in these technology far outweigh the benefits, and thus it would be rational to invest in other factors of production. Then these patented technology that have entered into public domain and lack exclusiveness have no takers, which results in severe waste. In consideration that the focus of U.S Federal government funded scientific research lies in the field of fundamental research, research findings tend to remain at the initial stage of product R&D. There is a long way to go from results of laboratory to product launch. Above mentioned issues become increasingly severe. By 1980 U.S federal government has owned nearly 28,000 patents, but only 5% of them have been transferred to industry for commercial development. In addition, government unilaterally considers public benefits, but overlooks benefits of inventors. No matter which policy above was adopted, outcomes of scientific researches funded by the government are profitless for scientific researchers. This demotivates researchers to disclose their inventions, particularly in consideration that transforming the outcomes of scientific researches into patentable technical proposal caused much extra work to be done for inventors.

During this period, U.S universities must file a petition to federal sponsoring agencies so as to obtain patent exclusive license by negotiation on case by case basis, but most ended in failure. This low-efficient bureaucratic approval procedure was denounced extensively. Therefore, in late 1950s, some governmental agencies started to sign Institutional Patent Agreements (IPA) with various universities, which enabled universities that are capable of technology transfer autonomously to possess patent right generating from the sponsored research outcomes automatically without concession on granting exclusive license, in order to simplify the procedure. 18 IPAs were signed by the end of 1958, but it was in stagnation due to change of policy until Health Education and Welfare Department USA (HEW) signed IPA again in 1968. From the year 1967 to 1974, 167 patent applications from universities signed IPA with HEW were approved while 162 petitions from the universities without signing IPA were rejected. It is visible that, IPA effectively simplified administrative examination and approval procedure, increased quantity of university technology transfer and was regarded as the prototype of Bayh-Dole Act. In the 1970s, less than 250 patents every year on average were granted to university in USA, which, according to estimation, only occupied a small part of scientific research findings sponsored by U.S government. Thanks to the IPA programs the number of university patents was obviously increased, but was still far from satisfaction.

Bayh-Dole Act in the 1980s was born under such background, where US government attempted to relocate scientific resources relying on market rule to activate the advanced technology sunk in laboratory and promote university research findings to transfer to industry sector. The essence of Bayh-Dole Act is to encode the terms in IPA, to make an unified and clear stipulation of the assignment of government funded research outcome patents, and allow universities to enjoy the patent right as well as the right to license out to third-parties exclusively while government only reserve a "March-in right", which allows the government agencies, in specified circumstances, to order contractors to grant a nonexclusive or exclusive license to a third-party. Since then, it had been established that US universities possessed extensive right of exploiting government funded research outcomes, which accomplished the transfer of the patent ownership from government client to contractor. Consequently, public sponsored research outcomes are released from the bondage of the regulations on government owned assets. Meanwhile, this act explicitly stipulated that, inventors have the right to share the revenue generated from research outcomes, which motivated the direct participants of scientific research.

After the enactment of Bayh-Dole Act, the classic model of US university technology transfer is

generalized as follows: USA federal government funded university scientific research; the research findings were disclosed to university affiliated TTOs; then TTO staffs evaluate the commercial prospect of the research outcome so as to determine whether to apply for patent. After the grant of patent, university possess patent right, the affiliated TTO takes charge of subsequent licensing and inventors hold the right to share revenue. The rationale behind the above-mentioned classic model of university-ownership of patent right as well as patent management through subordinate TTO lies in that: firstly, university is the contractor of federal contract and the party of federal grant agreement, when government clients waive the patent right of the research findings it funded, just as stipulated in Bayh-Dole Act, universities naturally become the direct assignee of patent right. Secondly, because the basic research findings in bio-medical field showed bright market prospect at that time, in order to relieve the pressure from university funding shortage, most universities expect to maximize profits from university patents through direct management of academic research outcomes.

One factor that cannot be ignored in the environment for implementing Bayh-Dole Act is that, most US universities hold the status as an independent legal entity. The judgment of supreme federal court on “Trustee of Dartmouth College V. Woodward” in 1819 established the independent legal personality of private universities in USA; in addition, according to the relevant laws of each state, most public universities in USA also possess corporate capacity or financial independence. Compared with general government agencies, these USA universities with status of independent legal person or financial independence behave more resembling to the profit-seeking market entity. So under market mechanism, U.S. universities carry unparalleled advantages in protecting and commercializing research outcomes, comparing to government bureaucracy. Above all, exclusive license enables licensees to get rid of the issue of “giving free ride” to competitors.

Statistics showed that, Bayh-Dole Act was such a great success since the amount of university patent and licensing incomes from government funded research outcomes increased substantially. The number of patents acquired by US universities in 1979 was only 264, which reached to 2436 in 1997 with increasing by nearly 10 times within 20 years. The amount of university-industry license agreements increased by 161%, and the incomes from the license of university patents even added to 520%. Even taking the contemporaneous tendency of fast growing bio-medical patents into consideration, one cannot deny the fact that the incline of university patenting activities in Bayh-Dole era is much steeper compared to that in IPA era.

2 Transplantation of Bayh-Dole system to EU

By the end of 20th century, many European countries such as Austria, Denmark, Finland and Norway remained similar university technology transfer systems to German “Professor’s Privilege” system (Hochschullehrerprivileg in German), in which university inventors own patent rights generated from scientific research findings sponsored by government and could obtain all of the revenue from patent licensing. The philosophy behind “Professor’s Privilege” is based on provision 3 of article 5 of current German constitutions—“Art and science, research and teaching are free (German: Kunst und Wissenschaft, Forschung und Lehre sind frei)”, in other words, the academia have the freedom of inquiry. Therefore, inventions made by professors or other university faculties were considered to be “free” inventions, belonging to the inventors.

Since the new millennium, inspired by the success of Bayh-Dole Act in U.S., most of the European countries that suffer from fiscal retrenchment abolished “Professor’s Privilege” and emulated the related rules in Bayh-Dole Act, which centered on institutional ownership, with the exceptions of Sweden and Italy. Distinct from the rationale behind U.S. enactment of Bayh-Dole Act, European

countries had different concerns which led to the moving away from “Professor’s Privilege”, under which inventors were supposed to take on the full burden of patent filing. Many researchers had no time and initiatives for patent application by themselves and were short in necessary funds to afford the cost for filing and maintaining patents. After these European countries adopted the Bayh-Dole system, the expenditure was now assumed by universities and necessary legal and commercial guidance was offered by their affiliated technology transfer office to the inventors, which could greatly reduce the burden on inventors in theory and thus is supposed to stimulate the transfer of technology at universities.

After the transplantation of the Bayh-Dole system to Germany, patent rights generating from public funded academic research outcome are owned by universities while inventors are entitled to 30% of total revenue. This reform certainly reduced the threshold for university researches to participate in patenting activities, but for inventors of high-value patents, their earnings from licensing were inevitably shrunk by a large margin. Moreover, this reform could disturb the existing relationship between academic inventors and industry. According to a questionnaire survey, implementing Bayh-Dole system in Germany was praised by a large part of university inventors while several blamed the new system severely. In considering the fact that the majority of patented technologies are not profitable and that the high-value patents are indeed rare cases, those criticisms were more likely came from the creators of inventions with promising market demand. If inventors expect that their inventions have considerable market potential and their estimated values are far higher than patent application fees and maintenance fees, then the inventors would prefer “Professor’s Privilege” system. By contrast, if inventors are skeptical about market prospects of their inventions, they’d better leave the risks and costs of patenting to universities. As a matter of fact, before the reform in Germany while some inventors applied for patents in their own name, other university inventors selected to leave their inventions at their employers’ disposal or assigning the patents applications to outside companies. Transforming from Inventor-ownership to institution-ownership actually deprive inventors of freedom of choice and of dominant role in technology transfer, which will be discussed in the following sections.

By 2008, among the major European countries, only Sweden and Italy still maintain “Professor’s Privilege” system, to different extent. However, a large number of empirical studies illustrate that in the countries that transform from “Professor’s Privilege” to “Bayh-Dole rules”, patenting activities of academic researchers didn’t improve as expected and in some countries even declined dramatically. The most extreme case might be Norway; by comparison between 3 years period after and before the reform, both the number of university patent applications and the amount of university spin-offs reduced by half. In the meantime, the percentage of university faculties who establish spin-offs in Sweden, where retains “Professor’s Privilege”, are twice as much as that in U.S. As for universities, Cambridge University, where formerly allow faculties to manage their own inventions, spun out much few university technology-based firms after “Bayh-Dole rules” were compulsorily implemented in the UK in 2001. According to a comparative study on six universities in North America, in University of Waterloo in Canada, the only university that implements inventor ownership, researchers in the field of computer science founded many high-tech spin-offs based on their own inventions. In terms of the R&D expenditures per spin-off, Waterloo was superior than other universities, whose closest competitor was University of Wisconsin where have a long tradition of “Professor’s Privilege” before Bayh-Dole Act implemented.

3 Implications

As contractors of scientific research projects funded by government, universities offer places and

other necessary facilities to researchers, therefore it is reasonable for universities to request certain amount of compensation. However, if universities aiming to maximize benefits take patent rights as their own and manage them by affiliated TTOs, it would set obstacle inside technology transfer process and would possibly demotivate inventors. This is not only unpractical for reaching the maximized profits but also would severely reduce overall efficiency of technology transfer. To ensure dominant role of inventors in technology transfer at universities, inventor's ownership should be established at first place. In addition, when revenue sharing ratio are negotiated between inventors and universities, as employees of universities, inventors are often at a position of weakness. Endowing inventors with patent rights could render them more bargaining power and thus could protect incentives to inventors better. When inventors choose a third-party TTO as service provider, patent application fees and maintenance fees are assumed by themselves and they usually also have to pay for consultation at a premium. If inventors cannot afford the cost or procrastinate on technology transfer within a reasonable period due to other reasons, for instance, some researchers driven by curiosity are indifferent to commercialization of their inventions, then universities shall retain "March-in" rights, which allow the universities, in certain circumstances, to apply for patent by themselves or to compel inventors to grant a nonexclusive or exclusive license to a third-party.

References

- [1] Palmer A M. Patents and University Research[J]. Scientific Monthly, 1948, 66(4):149-156
- [2] Hayter C S, Rooksby J H. A Legal Perspective On University Technology Transfer[J]. The Journal Of Technology Transfer, 2016, 41(2):270-289.
- [3] Clements J D. Improving Bayh-Dole: A Case For Inventor Ownership Of Federally Sponsored Research Patents[J]. 2009,49.
- [4] Kilger C, Bartenbach K. New Rules For German Professors[J]. Science, 2002, 298(5596):1173-1175.
- [5] Greenbaum D, Scott C. Hochschulehrerprivileg—A Modern Incarnation Of The Professor's Privilege To Promote University To Industry Technology Transfer[J]. Science, Technology And Society: An International Journal, 2010, 15(1): 55-76.
- [6] Damsgaard E F, Thursby M C. University Entrepreneurship And Professor Privilege[J]. Industrial & Corporate Change, 2012, 22(1):183-218.
- [7] Colaianni A, Cook-Deegan R. Columbia University's Axel Patents: Technology Transfer And Implications For The Bayh-Dole Act[J]. The Milbank Quarterly, 2009, 87(3):683-715.