

**Commercializing Government-funded Research:**

**China's Reception of the U.S. Bayh-Dole Act**

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**Abstract:**

In 2002, China adopted a law superficially similar to the U.S. Bayh-Dole Act. Many Chinese scholars refer to it China's Bayh-Dole in that it transfers the ownership of scientific discoveries created using public funds from government to universities. The law is designed to deal with some problems including stagnating academic innovation, and static downstream licensing. However, the traditional problems have not been solved whereas some new issues have occurred.

This paper aims to present the unintended consequences of China's emulation based on a comparative analysis of the stakeholder configuration in the U.S. and China. Competing interest among key stakeholders in the context are identified. The distorted roles of actor groups and the influence on the effectiveness of the law by their activities are further explored.

This paper gives a critical assessment of China's Bayh-Dole. It argues that China's transplant of credited successful U.S. experience is heavily characterized by a top-down, centralized decision making, and has not yielded similar results due to lack of appropriate premises and infrastructure. An achieving mechanism shall not be established unless conflicts of interest between various stakeholders are handled sensitively and efficiently.

**Keywords:** Government-funded Research, Bayh-Dole, Legal Transplant, Academic Innovation, Technology Transfer, Knowledge Dissemination

In 2006, China announced a long term goal of becoming a leading economic and technological centre by 2020<sup>1</sup>. The Chinese policy makers believe that, expanding the domestic innovation capacity shall reduce China's dependence on imported technology, enhance the nation's competitiveness, and further contribute to the domestic economic growth.

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<sup>1</sup> People's Republic of China. State Council, *National Outline for Medium and Long Term Science and Technology Development Planning (2006–2020)* 9 February 2006  
<[www.gov.cn/jrzq/2006-02/09/content\\_183787.htm](http://www.gov.cn/jrzq/2006-02/09/content_183787.htm)> (16 December 2008)

In the public research context, a series of policy and legislative actions were motivated to strengthen the propensity for innovation creation and technology transfer of universities<sup>2</sup>.

Historically, the Chinese universities were not active patenters and licensors. The Chinese patent law prior to 2001 only allowed them to become patentees in name only for inventions originated from government funds<sup>3</sup>. In addition, the academia and the industry sector used to disconnect with each other, and most of the outcomes from university laboratories were deemed to be inapplicable by the businesses.

What the Chinese government confronts is the problems universally exist in most national contexts. The Bayh-Dole Act enacted in the United States (U.S.) in 1980 is the first and well-known legislation governing Intellectual Property (IP) resulted from the federally-sponsored research that the fund recipients are permitted to own all IP which used to belong to the government<sup>4</sup>.

The Chinese policy makers highly admire the U.S. Bayh-Dole and this gave birth to what is often cited China's Bayh-Dole, 'Regulations on Intellectual Property Administration of National Science Research Programs (IPA Regulations)' in 2002. It is the primary purpose of this paper to examine China's accommodation of the Bayh-Dole doctrine. In the sections below, a brief overview of the legislation history and core principles of the Bayh-Dole Act is given first. Then, a comparison of the two laws in terms of form and substance is conducted to find out whether China has completely transplanted the Bayh-Dole doctrine or only built a shell of it. Meanwhile the effects and challenges of China's Bayh-Dole are investigated.

A primary methodology adopted in this study is stakeholder perspective analysis. By identifying the configuration of stakeholders and capturing their features in the two jurisdictions, we can see in what way that each stakeholder group is influenced by the law and

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<sup>2</sup> In what follows, 'university' includes research institutes.

<sup>3</sup> *Patent Law of the People's Republic of China* 1984 Art 6 <<http://nic.whu.edu.cn/netclass/wlfg/16.htm>> (8 December 2007). According to the English version of the patent law officially published, this sort of patent rights is held rather than owned by the patentees. The being-held here cannot be understood in the common way.

<sup>4</sup> Actually, it is a revision to the US Patent Act, namely 'University and Small Business Patent Procedures Act'. But people prefer to calling it Bayh-Dole which is named after the two senator sponsors of the bill.

how the influence occurs, figure out the conflicts between the execution of the B-D doctrine and the stakeholders' interest, and examine the positive and negative factors to the effects of the law.

## 1. The Bayh-Dole Act

The eligibility for ownership of inventions created from publicly-funded research was the focal point of congress debates accompanying with the increasing intensity of federal research investment during the three decades since 1940s in the U.S.<sup>5</sup> However, there had been no uniform patent policy by the 1980s, and the federal funding agencies negotiated with universities case by case when the latter requested for titles to the inventions they created, which aroused concerns in Congress and complaints from universities<sup>6</sup>.

A bill was introduced in 1978 allowing universities and small businesses to elect titles to inventions originated from government-financed research, and transfer their technologies to the private sector for royalties<sup>7</sup>. Pushed by the lobbying activities of the universities and industry, the Bayh-Dole Act was passed overwhelmingly in Congress on December 12, 1980 and became effective in July 1981<sup>8</sup>.

The fundamental principle of Bayh-Dole is that it gives US universities control of their inventions arising from public funding. And if a university does not want to elect to the title, the individual inventor(s) may acquire the patent for the invention. Prior to Bayh-Dole, the default ownership of all such IP rest with the federal government. The most important change of this legislation is that it reversed the presumption of the title of the property created using public money. Universities are encouraged to issue exclusive licensing to private companies and keep the royalty incomes at their side. Meanwhile they are subject to a number of

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<sup>5</sup> Mowery, David C et al, *Ivory Tower and Industrial Innovation: University-Industry Technology Transfer Before and After the Bayh-Dole Act* (Stanford : Stanford University Press, 2004), 86

<sup>6</sup> Id, 45, 88

<sup>7</sup> The United States.Senator Birch Bayh, *Bayh-Dole: Don't Turn Back the Clock* the Licensing Executive Society 2006 Annual Meeting (New York, 12 September 2006)

<sup>8</sup> Eisenberg, Rebecca S, 'Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research' 82 (1996) *Virginia Law Review* 1663, 1677 n 48

obligations. Universities should ensure their advanced technologies beneficial to the U.S. domestic industries and labor primarily. While keeping the royalties, the universities have to share them with inventors and faculties. The remains are required to be spent in education or further research. On the other hand, the government reserves its rights and shall march in under certain circumstances.

In spite of the controversies rising in recent years about its impacts on research in some rapidly developed fields, Bayh-Dole is widely viewed as a catalyst for innovation and technology dissemination, which contributes to the U.S. world leading position in S&T. This induces Chinese policy makers' decision to pattern after the U.S. approach with the intents of importing its success. After seven years implementation, however, consideration should be given to whether the Chinese legislative schemes have created similar effects to what Bayh-Dole arguably has had on the U.S. research economy. This should start with a comparison of the prescriptions of the two laws as set below.

## **2. Bayh-Dole Marked Made-in China**

The Bayh-Dole Act is a part of the Patent Act in the U.S., whereas the IPA Regulations is interior to the patent law in China. However, contrary to that only federally-funded programs are subject to Bayh-Dole in the U.S., the co-legislator of the IPA Regulations, Ministry of Finance (MOF), makes it applicable to all research projects no matter they are at the national or local level, as long as the funds mainly come from the MOF.

### **2.1. Policy and Objective**

The overlapping of the goals of the two systems exists along one dimension. The IPA Regulations' primary intent to promote the productive use of government-funded research<sup>9</sup> which is exactly the same as the first objective enumerated in the U.S. Bayh-Dole. It is deserved to note that an important tenet contained in Bayh-Dole but not identified by the IPA

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<sup>9</sup> *Regulations on Intellectual Property Administration of National Science Research Programs* of 2002 (People's Republic of China) The Preamble

Regulations is that government-sponsored research should serve the general public, and any manner developing inventions that may lead unfair competition or impede subsequent scientific research is forbidden<sup>10</sup>. Besides, one expressed objective of Bayh-Dole to economically improve the government administration of patents created in its funding cannot be found in the IPA Regulations<sup>11</sup>.

## 2.2. Definitions

Unlike Bayh-Dole, there is no definition for terms particularly provided in the IPA Regulations. But most of the terms listed in Bayh-Dole can be understood same in China. The only exception is that the term “contractor” includes research performing entities or individuals in the U.S.<sup>12</sup>, whereas researchers cannot be the direct recipients of government funds in China<sup>13</sup>. Besides, the adjusting range of the IPA regulations is comparatively vague. It is defined as “all research programs supported mainly by state treasury”<sup>14</sup> whereas it is much clearer in Bayh-Dole<sup>15</sup>.

## 2.3. Disposition of Rights

Although the government grant recipients are permitted to retain titles to the inventions stemmed from their research in the two countries, they get that eligibility automatically pursuant to the IPA Regulations but only after meeting some prerequisites according to the Bayh-Dole Act. If recipients have not satisfied the procedural requirements in the U.S., the funding agencies may hold the titles<sup>16</sup>. In China, individual inventors are not eligible for retaining ownership of public research, and there is no prescription on which party can obtain the titles if the universities waive their right.

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<sup>10</sup> *Amendments to the Patent and Trademark Act 1980* (US) S 200  
<[http://www4.law.cornell.edu/uscode/html/uscode35/usc\\_sup\\_01\\_35\\_10\\_II\\_20\\_18.html](http://www4.law.cornell.edu/uscode/html/uscode35/usc_sup_01_35_10_II_20_18.html)> (8 December 2007)

<sup>11</sup> Ibid

<sup>12</sup> Id, S 201 (c)

<sup>13</sup> Above, n 9, Art 1

<sup>14</sup> Above, n 9

<sup>15</sup> Above, n 10, S 201 (b) .Research work wholly or partly sponsored by the U.S. federal government shall be regulated by Bayh-Dole.

<sup>16</sup> Id, S 202 (c) (1), (2)

Bayh-Dole's restraint on conveyance of patent rights does not exist in the IPA Regulations. While universities are free to assign their patent rights in China, Bayh-Dole prohibits contractors from doing so unless such assignments are conducted between two government fund recipients<sup>17</sup>.

## **2.4. Exceptions**

In terms of exceptional cases refraining recipients from owning titles, protection for research of significance to state is primarily concerned in the two jurisdictions. In China, research institutions cannot claim their IPRs over any innovation relating to the security or other interests of the state or vital public interest<sup>18</sup>. Rather, the government funding agencies shall decide which party the IP ownership resides<sup>19</sup>. Comparatively, Bayh-Dole presents more concrete and enforceable exception descriptions<sup>20</sup>.

## **2.5. Duty to Commercialize**

American and Chinese government fund recipients both have a responsibility to pursue commercialization of their innovations. Moreover, the U.S. government agencies also have such an obligation on them<sup>21</sup>. As to the commercializing practice, neither recommendation of exclusive licensing nor the geographical limitation indicated in Bayh-Dole is written in the IPA Regulations.

## **2.6. Royalty Distribution**

Although Bayh-Dole's "sharing royalty with inventor" principle is recommended in the IPA Regulations, the Chinese universities can only find some guidelines in other laws<sup>22</sup>. In practice,

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<sup>17</sup> Id, S 202 (c) (7) (A)

<sup>18</sup> Above, n 9, Art 1

<sup>19</sup> Id, Art 4

<sup>20</sup> Above, n 10, S 202 (a) (i)-(iv)

<sup>21</sup> Id, S 209

<sup>22</sup> Such as Patent Law and Law on Promoting the Transformation of Scientific and Technological Achievements. Above, n 9, Art 8

either the issuance of rewards to inventors or the spending of licensing incomes is left to the universities' discretion.

## **2.7. Reservation at Government's Side**

Like the U.S. federal government, the Chinese government also sets forth its right in retaining title to public research in the IPA Regulations. In certain conditions, the government, in order to meet the needs of government and/or state, has gratis rights to use, exploit inventions resulted in public funding, or make them being effectively practiced, and to obtain benefits<sup>23</sup>. However, the conditions suitable for executing government's reserved rights are not defined distinctly in the IPA Regulations, rather, shall be determined by the government.

## **2.8. March-in Rights**

No literal March-in Right prescriptions can be found in the IPA Regulations, which, however, does not mean that the Chinese government has no legitimate March-in Right in public research as the U.S. government does based on Bayh-Dole. The IPA Regulations is subordinate to the Chinese patent law, which actually grants the government much broader March-in Rights referring to all inventions created in China, not only from government-sponsored research. In fact, the March-in threshold is lower for Chinese government than it is for the U.S. federal government<sup>24</sup>.

## **2.9. Supervision and Appeal**

Compared with the Bayh-Dole Act, the IPA Regulations only has a very vague article concerning how university administrations superintend the patenting and licensing work. However, no implementing guidelines are further provided. Comparatively, Bayh-Dole clearly specifies elements needed to embody obligations on the contractor(s) in a funding

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<sup>23</sup> Above, n 18

<sup>24</sup> A service invention-creation is defined to be "an invention-creation, made by a person in execution of the tasks of the entity to which he belongs, or made by him mainly by using the material and technical means of the entity".

agreement. Even, drafting requirements of the clauses are provided<sup>25</sup>.

On the other hand, the IPA Regulations does not adopt any measures to supervise the official decision making. But in the U.S., when exercising their reserved rights and March-in Rights, the government funding agencies are under supervision of a higher level government authority and required to submit a written explanation<sup>26</sup>. Corrections shall be recommended by the authority if the determination is believed inconsistent with Bayh-Dole's policies and objectives<sup>27</sup>.

Another big handicap of the IPA Regulations is that it provides no channel for the participants of a research project to raise their disagreements or objections to the determinations made by government agencies.

From the comparison above, significant differences can be discerned between China's and the U.S. legislation. Of course, it is quite common that adjustments are made in a country's legal transplant so that the foreign policies can be accommodated within its particular jurisdiction. Different laws may produce similar effects in different political and social environment. As far as the initial goals of the IPA Regulations have been achieved, the difference of it with the U.S. Bayh-Dole can be ignored. Therefore, it is necessary to have an examination of the effects of China's Bayh-Dole on the university patenting and licensing.

### **3. Unintended Consequences of China's Bayh-Dole**

The patent-related data released for the first five years of the implementation of the IPA Regulations present a paradox. Patent applications filed by the Chinese universities increased over 5.5 times by the end of 2007, but the growing rate decreases 40 per cent if the Utility Model applications are excluded<sup>28</sup>. On the other hand, the patents obtained by the Chinese universities do not show the same increasing trend even when the lag of two to three years

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<sup>25</sup> Above, n 10, S 202 (c), (f) (1), 209 (d) (3)

<sup>26</sup> Id, S 202 (b) (1)

<sup>27</sup> Ibid

<sup>28</sup> Generally, Utility Model patent (applications) involve less advanced technology as the applications do not undergo substantive pre-grant examination.

between filing and granting dates is considered. The average invention patents annually granted to the universities account for only one third of their filings, which naturally leads to the question that whether the quality of the academic research matches the quantity of its outcomes<sup>29</sup>.

The licensing of the patents to the industry sector is more frustrating. According to the statistics announced by the municipal government, the patent licensing rate of the universities located in Beijing is only 1.67% in 2007 and the average number from 2001 to 2006 is 1.23%<sup>30</sup>. Considering Beijing is an area most endowed with top-quality universities in China<sup>31</sup>, it is not difficult to deduce that the downstream development of public sector research in other cities is more unsatisfactory.

One more worrying problem is that, when some university inventions are finally translated into products or services, they are generally provided at a higher price to the customers as patent is a label of being expensive. This can be illustrated with a very serious nation-wide ethical problem: high prices for pharmaceuticals and other healthcare technologies, including those nourished by government funds, have prevented lower income patients from obtaining necessary treatments, including life saving therapies.

The impacts of China's Bayh-Dole can be further examined with a deep investigation into the ecology of various stakeholders in the context and the conflicts of interest arisen under the current legal framework.

## **4. Stakeholder Alliance**

### **4.1 The Monopolizing Government**

Unlike that the U.S. Bayh-Dole is a product after years' intense congress debates and quite a

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<sup>29</sup> People's Republic of China. State Intellectual Property Office, *Patent Annual Statistics 2003-2007* <[www.sipo.gov](http://www.sipo.gov)> (16 December 2008)

<sup>30</sup> Zheng, Jinwu & Zhang, Fuxing, 'The Technology Transfer of the Universities in Beijing Proceeded along a Steady Course in 2007' (28 October 2008) <<http://www.chinatorch.gov.cn/ckzl/scdt/zxdt/200810/8752.html>> (12 January 2009)

<sup>31</sup> Chen, Kun & Kenney, Martin, 'Universities/Research Institutes and Regional Innovation Systems: The Cases of Beijing and Shenzhen' 35 (2007) *World Development* 1056, 1057

few legislative drafts, the enactment of the IPA Regulations is a quick decision made by governmental bodies that can execute lawmaking power according to their administrative functions in China<sup>32</sup>.

The Chinese government plays a prominent and influential role in legislation<sup>33</sup>. Generally, the creation of a law in China is an outcome far from that of a lawmaking process in which key interested groups have participated but inspired by brainwork of a few bureaucracies, mainly in order to best serve the latter's political missions<sup>34</sup>. According to the Chinese constitutional law, only certain state organs and groups of legislators who are nominated by the central Communist Party, have the rights to raise bills or legislation proposals<sup>35</sup>. There is little lobbying space for non-governmental organizations<sup>36</sup>.

The export restriction on sensitive technologies greatly stimulates the Chinese policy makers to involve S&T regimes. One of the typical governmental interventions is the one-sided determination of priority developing fields, which represents Chinese policymakers' belief that technology advancement can be steered<sup>37</sup>. Indeed, most of the national research projects are launched by the top-level government leaders whereas other stakeholders played a slight role in generating policy ideas.

Comparing to the U.S., the Chinese government supports the downstream development of public research in a way with more direct interference. Besides playing a match maker role in facilitating university-industry partnership, the Chinese government supports the industrialization of some representative homegrown innovations either with direct investments or by exercising procurement tools.

However, the Chinese government has not been good at identifying innovative technology.

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<sup>32</sup> *Constitution Law of People's Republic of China 1954* Art 70; Corne, Peter Howard, 'Creation and Application of Law in the PRC' (2000) 50 *American Journal of Comparative Law* 369, 373

<sup>33</sup> Tanner, Murray Scot, 'How a Bill Becomes a Law in China' (1995) 141 *The China Quarterly* 39, 42

<sup>34</sup> *Id.*, 44

<sup>35</sup> *Constitution Law of People's Republic of China 1954* Art 70

<sup>36</sup> *Above*, n 33

<sup>37</sup> Serger, Sylvia Schwaag & Bredne, Magnus, 'China's Fifteen-Year Plan for Science and Technology: An Assessment' (2007) 4 *Asia Policy* 135, 136

Financial aids to programs claiming indigenous innovation are provided without scrutiny. The allocation of supportive funds is heavily influenced by political interest and even personal preference of some high-level leaders. Projects included in the top leaders' favored sectors are of nearly unrivaled importance. Due to the lack of transparency of the decision making process, participants do not have equal chances to assess the government resources. Consequently, innovative activities may not be adequately rewarded and nourished.

#### **4.2 The Academia with Mixed Ecology**

Regardless of the institutional reforms, the Chinese universities are still subject to tight control of the government. Their operation is heavily influenced by the political and administrative forces, and the behaviours of the administrators and researchers are greatly policy-oriented<sup>38</sup>. A unique phenomenon in China is that either the universities or their administrators have official ranks<sup>39</sup>. Instead of public election, all principals of public universities are appointed by the government in China<sup>40</sup>. There is rarely a precedent that a candidate was selected from those scientists or educators without administrative ranks<sup>41</sup>. And the principals of the key universities have a common feature in their experience that they had been government officials for years before the appointment<sup>42</sup>.

Another outstanding difference between China and the U.S. in this context exists in the

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<sup>38</sup> Chen, Yang & Sanders, Richard et al, 'The Commercialisation of Chinese Universities and its Effects on Research Capacity'

<<http://portal.unesco.org/education/en/files/51630/11634281145WangChen-EN.pdf/WangChen-EN.pdf>>

(8 December 2007)

<sup>39</sup> Han, Fei, 'Thirty-two Universities are at Vice-ministerial Level in China' (13 November 2006)

<[http://blog.chinaunix.net/u/11310/showart\\_199404.html](http://blog.chinaunix.net/u/11310/showart_199404.html)> (17 March 2008); 'CPPCC National Committee Member Proposed to Cancel the Administrative Classification of Universities and Elect Principals Democratically' (9 March 2009). So far thirty-two universities in China have been classified as vice-ministerial level schools and their principals and the party committee secretaries are equivalent to vice-ministers of a government Ministry. <<http://news.sina.com.cn/c/2009-03-09/040717364169.shtml>> (12 April 2009)

<sup>40</sup> Han, Shuifa, 'There is no Cai yuanpei-like Educationist in China' 7 July 2006

<<http://view.news.qq.com/a/20060707/000033.htm>> (17 June 2009). Cai Yuanpei (January 11, 1868 – March 5, 1940) was a Chinese educator and the chancellor of Peking University in the early 20th century. He is well known for his promotion of the independence, autonomy and research freedom of a modern university.

<sup>41</sup> Paratrooper Principals will not Benefit Education Run by Educationists' 7 February 2008

<<http://jy.chinawuxi.gov.cn/tslm/gd/304142.shtml>> (12 April 2009)

<sup>42</sup> Ibid

historical link between the universities and industry. Collaboration and technology diffusion had occurred between the American universities and industry long before the passage of Bayh-Dole. On the contrary, the academia in China historically was disconnected from the industry. The universities in China were fully supported by the central government and did not have to compete for external resources. Therefore, most of their research was separated from production.

The administrations of the Chinese universities made quick responses to cater to the government policy priorities. The Chinese universities then become an active patent applicant abruptly as the government believes the improvement of innovation capability is reflected in the increase of patent filings. Besides, they shift their focus to commercializing their research fruits although technology transfer had been quite unfamiliar to them.

Attention should be drawn to the special ecology of Chinese intellectuals. Within a system subject to political control, the Chinese intellectuals adopt variant paths for their personal development based on the different status of their priorities and vision<sup>43</sup>. Some people shift their career focus to administration and act more like government officials. Along with the promotion of their administrative positions, their academic titles usually go higher. Some people determine to focus on pursuit of personal interest via well attuning to school administrators' tastes. Most of the Chinese intellectuals choose a moderation path. They want to hold to their convictions in research pursuits, but meanwhile, they have to be practical and flexible for survival in a complex environment. The different state of these academics on campus indeed determines the different stakes they hold in the context.

Strong administrative intervention or even personal preference involved in the research process causes the unbalancing stake distribution among academics. High level administrators of the Chinese universities are often nominated to be principal investigators on research since their administrative titles are a kind of guarantee of getting the government funds<sup>44</sup>. An absurd phenomenon is the trinity of some members in the peer review panel of research fund

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<sup>43</sup> Above, n 38

<sup>44</sup> Xiong, Bingqi, *Problematic Universities* (Chengdu, China : Tiandi Publisher, 2004), 78

applications. That is, one person undertakes three roles simultaneously as reviewing the applications, performing research projects, and evaluating research outcomes.

Realizing the strong influence of political strength and administrative power, some intellectuals who want to profit themselves have learned to please relevant government authorities in numerous ways<sup>45</sup>. During the research, they raise the research questions carefully, screen the facts and choose the language in their reports to present what the policy makers hope for<sup>46</sup>. It is then not surprising to see misconduct arises from time to time in the Chinese scientific community.

The intellectuals in the moderation path are the least advantaged group. The current government grant mechanism in China cannot satisfy their pursuits for professional prestige, reputation and new stimuli for follow-on research. Most of the government-funded projects are policy-oriented and fail in providing the academics a ground to conduct curiosity-driven research. When there are some substantial advancements, the honor usually goes to the high level administrative leaders<sup>47</sup>. Another disincentive factor is that most universities have not established a royalty-sharing friendly mechanism to their inventor professors.

### **4.3 The Incompatible Industry Sector**

The initiatives at the industry side for an expeditious and widest utilization of the discoveries resulting from government-sponsored research have not been drawn forth in the Chinese context. The Chinese industry has a long-standing view of the academic research that generally it is unsuccessful in creating applicable technology with commercial value. From its perspective, most of the laboratory technologies are immature and require time and money to develop<sup>48</sup>.

The indifference to innovation at the industry side is another factor leading to the weak

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<sup>45</sup> Holz, Carsten A, 'Have China Scholars All Been Bought?' (April 2007)  
<<http://www.feer.com/articles1/2007/0704/free/p036.html>> (1 November 2008)

<sup>46</sup> Ibid

<sup>47</sup> Above, n 44, 138

<sup>48</sup> Guan, Jiancheng et al, 'Collaboration Between Industry and Research Institutes/Universities on Industrial Innovation in Beijing, China' (2005) 17 *Technology Analysis & Strategic Management* 339, 345

partnership between Chinese enterprises and universities. Although a series of economic reforms have been conducted since the 1980s, a market-based competition milieu has not been formed in China. State-owned enterprises (SOEs) continue to hold predominance or monopoly in certain industries<sup>49</sup>. The short-termism problems in management also disincentivize the SOEs to engage in downstream development of academic research which may be time costly and risky<sup>50</sup>. On the other hand, private companies have to survive based on either low cost operation or the advantageous status due to their strong ties to the government<sup>51</sup> rather than providing novel products or services. Therefore, the majority of Chinese firms have not made innovation as one of their primary business strategies<sup>52</sup>.

Unlike the common industry-university collaboration mode in the U.S., the commercialization of public research in China is based on a mode of government-industry-university<sup>53</sup>. It is very difficult to build linkage across sector boundaries in China since the current institutional framework is inadequate for governing such relationship<sup>54</sup>. Consequently, government intervention has to be activated for constituting a stable and safe partnership<sup>55</sup>. However, the government has not helped establish a communicate channel to let the two sectors talk to each other about what each of them really needs. Instead, the government representative agencies often determine the technology to be licensed and the licensee based on policy priorities but ignore the practicability of the technology and the absorptive capacity of the designated licensee company.

The sterility of the arranged technology transfer is attributable to the SOE's strong initiative in getting political benefits. Getting good assessment of their political performance is the SOEs' operation priority. From the SOEs' perspective, developing a technology favored by the policy makers is a political task and whether that industrializing process has a profitability

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<sup>49</sup> Alford, William P, *To Steal a Book Is an Elegant Offense Intellectual Property Law in Chinese Civilization* (Stanford : Stanford University Press, 1995) 84. The SOEs here include state-invested enterprises.

<sup>50</sup> Above, n 5

<sup>51</sup> Lewis, James A, *Building an Information Technology Industry in China National Strategy, Global Market* (Washington, D.C. : the CSIS Press, 2007), 3

<sup>52</sup> Above, n 5, 11

<sup>53</sup> Ibid

<sup>54</sup> Ibid

<sup>55</sup> Ibid

prospect is not in their consideration. Generally, the risks occurred in industrializing process are imposed on by the government-controlled banks or venture capital (VC) firms.

In addition, lack of sufficient technical support from researchers exacerbates the low efficiency issue of the technology transfer. Usually the licensee company designated by the government is not the proper candidate to the researcher(s). Besides, the university administration always involves in to supervise the proceedings. The extra bureaucratic burden accompanied and the unstable reward internal policies greatly reduce researchers' willingness in devoting time and efforts to work together with an unfavored company.

On the other hand, over intervention of the administrators, and lack of certain flexibility and adaptability in the university management hamper the private firms from adopting academic inventions. However, researchers can pass their creative ideas inspired by or the know-how associated with the public research to those private companies having close ties with them, and expect generous payment for such activities<sup>56</sup>.

Besides a compatible interaction of the primary stakeholders in the context, downstream development of new technologies cannot proceed smoothly without stable and lasting funds, which are usually in the forms of bank loans and venture capital (VC) investments. Below the functioning of the Chinese banking and VC markets in relation to public research are examined.

#### **4.4 No Market Economy Angels**

The development of the Chinese VC industry begun in the middle of 1980s and was driven by the Chinese government's efforts in establishing national innovation system<sup>57</sup>. While the academic research and the industry production in China have been proceeding on two uninteractable trajectories, the Chinese policy makers expect VC to be a mechanism improving the linkage of the two sectors<sup>58</sup>. The Chinese VC industry thus expanded quickly

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<sup>56</sup> Ibid

<sup>57</sup> White, Steven et al, 'Antecedents and Institutionalization of China's Venture Capital System' <<http://ged.insead.edu/fichiersti/inseadwp2004/2004-52.pdf>> (20 April 2008)

<sup>58</sup> Ibid

in a context traditionally having a very poor VC culture<sup>59</sup>.

Comparing to their counterparts in most industrialized economies, China's VC firms have a strong policy-oriented nature. The Chinese VC system mainly consists of government VC firms, and focuses on serving the development of the projects designated by the government and SOEs are the primarily investment ventures, but fails to provide prominent support to young technology-based enterprises<sup>60</sup>.

Political interference in investment decision making has created an extreme imbalance in the technology transfer regime of public research. On one hand, overinvestment is prone to happen when the policy makers over-stress the significance of some research for certain political interest<sup>61</sup>. On the other hand, most private technology-based businesses are suffering a lack of seed or start-up funds as they are not politically competitive in the VC market<sup>62</sup>. Neither these private firms can expect equal treatments to the SOEs in the banking system. The nonperforming loans in the banks' portfolios caused by the prioritized projects have raised the entry threshold for those private ventures having no strong political background.

Accordingly, China's financial system still has a vestige of plan economy, and neither the ordinary bankers nor the Chinese VC firms have sufficient incentives or skills to expend their efforts to provide value-added assistance to their investment ventures. On the other hand, even there exists some independent venture capitalists, they are reluctant to invest in the projects related to government funded research due to the so called Valley of Death<sup>63</sup>. This partly explains why the downstream industrialization of the university research relies heavily on the continuous support of the government.

Ironically, although the Chinese VC industry was initiated to foster domestic innovations,

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<sup>59</sup> Qiao, Yi, 'Three Stages of the Development of China's Venture Capital Industry' (11 April 2008) <<http://it.enorth.com.cn/system/2008/04/11/003121209.shtml>> (24 November 2008)

<sup>60</sup> Above, n 57

<sup>61</sup> Above, n 51, 6, 33

<sup>62</sup> Organisation for Economic Co-operation and Development (OECD), 'Reviews of Innovation Policy China' (2007) <<http://www.oecd.org/dataoecd/54/20/39177453.pdf>> (21 May 2008)

<sup>63</sup> Li, Guojie, 'Technology Transfer is the Weakest Part in China's national Innovation System' *People's Daily* 14 September 2006 <<http://www.cas.cn/10000/10001/10010/2006/107191.htm>> (12 December 2008)

the current Chinese policy makers have already excluded it from the actor set in the context. The originally set roles and functions of this sector are being marginalized in the national institution system<sup>64</sup>.

## 5. Concluding Remarks

China does not have a real set of science and technology laws and policies, but what it has is just science politics. In the highly technically field, the legislation and decision making should depend greatly on the scientists and technical experts. However, in China, they are heavily intervened by the government, and based on discretion of the top leaders. Serving political purposes comes to characterize the processes of making S&T laws or policies, which indeed has created severe misleading impacts.

A fundamental difference of the IPA Regulations with its American template is that the former is the brainchild during the government's pursuance of political interests and characterized by its creation in a centralized top-down way. Although executed by way of mass mobilization, the original goals of the China's Bayh-Dole have not been attained. By contrast, there are certain unintended consequences emerged in practice including misconduct on campus and disregard for the research accountability.

As a conclusion, the emulation of the U.S. Bayh-Dole in China is a failure. China's Bayh-Dole has not created an incentive mechanism which could effectively stimulate the stakeholders to participate initiatively and inventively as the policy makers hoped. The interest conflicts between stakeholder groups have not been properly handled under the current framework. The Chinese policy makers should recognize that similar legislation will not automatically create the same results in a very different socioeconomic and political context, not to say a simple literal translation of some English articles.

Unfortunately, China cannot solve the existing problems just by taking some reform

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<sup>64</sup> Mai, Ke, 'Where Are the Dragon Chips Applied in China?' (27 April 2005) <<http://bjinfo.it.hc360.com/html/001/009/001/80543.htm>> (19 December 2008). In the recent road-map plans for developing small and medium-sized S&T enterprises, no duties have been imposed on the VC industry.

measures. The current situation cannot be improved unless sufficient infrastructure is established in the Chinese legal framework such as, safeguards of public interest, an effective IP enforcement system, a mature institutional framework ensuring fair competition., transparency in legislation and implementation, unimpeded information flow, and an independent judiciary.