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The Protection and Utilization of Public Funded Intellectual Property Bill, 2008: A Critique in the Light of India'sInnovation Environment*

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The article critically reviews stated objectives and provisions of the proposed Indian Protection and Utilization of Public Funded Intellectual Property Bill, 2008 with a view to determining the impact the Bill, if enacted, might have on the innovation environment in India. The Bill may be premature in the current Indian innovation environment. Methodology adopted includes legal, statistical and comparative analysis and interviews. Relevant Indian policies and regulations aimed at promoting intellectual property creation, protection and commercialization have also been studied.

Keywords: Bayh-Dole, Public Funded Intellectual Property Bill, innovation, technology transfer, government funded research, intellectual property rights, patents

Despite widespread optimism regarding the proposed Bill's potential to increase university patenting and technology transfer activity, developing countries have been slow to adopt legislations modeled on the celebrated Bayh-Dole Act (BDA) of the United States.[1] Although success stories attributed to encouraging environment created by the BDA have, in recent years, caught the attention of policy makers in developing countries including in India, various scholars and practitioners have cautioned that given the myriad socio-economic and cultural realities of developing countries, a number of different frameworks of laws and policies may be needed instead of or in addition to a BDA style framework to best achieve the goals of innovation, technology transfer and economic growth in these countries.[2]

This article studies the Indian Protection and Utilization of Public Funded Intellectual Property Bill, 2008 ('the Public Funded IP Bill' or 'the proposed Bill') as tabled before the Rajya Sabha.[3] It aims to determine the impact the Bill, if enacted, might have on the innovation environment in India. Accordingly, the paper is divided into three broad sections, further divided into parts and sub-parts: Section I discusses relevant Indian policies and regulations aimed at promoting intellectual property (IP) creation, protection and commercialization. Section II critically examines the proposed Bill under three broad parts: the first part studies the objectives of the Bill in the light of the current innovation environment in India. Comparisons have been made, where relevant, with the environment that existed in the US at the time of the passage of the BDA. The second part studies key terms under the 'definition' section of the proposed Bill with a view to highlighting the ambiguities therein. The third part studies the substantive provisions of the Bill to determine the impact that these provisions might have on the Indian innovation system and whether they are likely to help achieve the stated objectives of the Bill. Section III provides a summary of suggestions and conclusions.

Policies and Regulations Supporting Innovation in India

India has an elaborate incentive mechanism for the creation and protection of IP in the form of several IP protection legislations.[4] These legislations were passed in furtherance of India's policies to encourage creativity and innovation, while at the same time, keeping the larger public interest in mind. Under most of these legislations, the default owner of the intellectual property rights (IPRs) is the author/inventor. However, contrary stipulations in

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valid contracts are respected as per the provisions of the Indian Contracts Act, 1857.[5] It is therefore common for funding institutions to enter into contracts with recipient institutions requiring the latter to assign all IPRs (resulting from the use of the given funds) to the former.

This section briefly describes the Indian Science and Technology Policy, 2003 (S&T Policy, 2003 or 2003 Policy) and describes how the proposed Bill has its roots in this Policy.[6] Thereafter, it describes several notices/guidelines issued by various ministries and departments of the Indian government aimed at conforming to a BDA style framework and how, despite these efforts, there continues to be uncertainties and non-uniform practices among various government funding agencies.

India's Science and Technology Policy, 2003

Since independence in 1947, India has promulgated 3 S&T policies: the Scientific Policy Resolution of 1958, the Technology Policy Statement of 1983, and most recently, S&T Policy, 2003.[7,8]

The S&T Policy, 2003, is a significantly more sophisticated document than its two predecessors, and identifies some of the key lacunae in the S&T system in India. It evolves from the language of 'encouragement' (as used in the previous two policies) to 'vigorous fostering of scientific research in universities and other academic, scientific and engineering institutions….' To achieve its objective, the 2003 Policy states the government's intent is to, *inter alia*, (1) provide greater autonomy to all academic and R&D institutions to encourage creative work; (2) promote technology development, transfer, absorption and upgradation with emphasis on making Indian industries globally competitive; (3) promote public-private partnerships (PPP) for R&D in areas of relevance for the Indian economy and society and (4) develop technologies that add value to India's indigenous knowledge (B, C of the Policy)

For the first time, the 2003 Policy also includes a 'Strategy and Implementation Plan' and emphasizes, *inter alia*, the need to (i) create a comprehensive national system of innovation (C7); (ii) evolve flexible mechanisms to help scientists and technologists to transfer know-how generated to the industry, and be a partner in receiving financial returns (C8); (iii) generate and provide fullest protection of competitive IP from Indian R&D programmes (C11); (iv) ensure that all Indian IP legislation provide maximum incentives to undertake large scale and rapid commercialization of indigenously generated technology; and (v) promote development of skills and competence to manage IPR and use it as a policy tool to leverage its influence. It was in furtherance of these policy objectives, that the government introduced the Public Funded IP Bill.

Regulations of Government Funding Agencies

Recent years have seen modifications in government policies and guidelines aimed at giving greater autonomy and incentive to institutions receiving public funds for R&D to create, own, license and even assign any IP that results from these funds. This section discusses a few of these guidelines and brings forth the uncertainties that continue to exist because of non-uniform written regulations and policies of various government funding institutions:

Currently, there are several government funding institutions in India that provide grants for R&D under their own unique sets of terms and conditions. Needless to say, practices of these agencies are not uniform. As per Rule 215 (3) 1 of the Government of India's General Financial Rules, 2005 (GFR 2005), when Ministries or Departments of the government sponsor projects or schemes (to be undertaken by universities or other autonomous organizations such as the Council for Scientific and Industrial Research (CSIR), these must include a stipulation that 'ownership in the physical and intellectual assets created or acquired out of such funds shall vest in the sponsor.[9] Accordingly, the Department of Information Technology (DIT) (Government of India) requires all IP resulting from R&D conducted using its funds to be assigned to it.[10]

However, the Department of Science and Technology's (DST) (Ministry of Science and Technology), Guidelines for Technology Transfer and Intellectual Property encourage institutions receiving grants from the DST to seek protection of IP resulting from the funded R&D projects.[11] It further provides that 'while the patent may be taken in the name(s) of inventor(s), the institution shall ensure that the patent is assigned to it' and that 'the institution shall take necessary steps for commercial exploitation of the patent on exclusive/ non-exclusive basis…. [and] retain the benefits and earnings arising out of the IPR.' The guidelines also require the institution receiving DST funds to share such earnings (no more than 1/3rd of actual earnings) with the inventor(s).

One may argue that the DST's Guidelines are in violation of the GFR 2005. However, there is

evidence that the government of India has instructed funding agencies not to claim any rights over IP created using government funds (in accordance with the S&T Policy 2003).[12] It must be noted, however, that these notifications as well as the S&T Policy, 2003 are unknown to most members of the public, including, in several cases, recipients of government funds. Furthermore, unclear policy statements would be trumped by contrary stipulations in funding agreements. It appears therefore that despite clear statements in the S&T Policy, 2003, there is currently, an absence of uniformity, resulting in uncertainty in the rules governing ownership of IP resulting from public funded research in India. A legislation bringing in uniformity and predictability in such government rules would therefore be welcome. However, this positive result may be offset by a number of negatives resulting not only from several provisions of the proposed Bill as currently drafted, but also from its premature introduction into the current Indian innovation environment.

The Public Funded Intellectual Property Bill, 2008

This part of the paper evaluates the proposed Bill in three parts: Part A critically evaluates the stated and perceived objectives of the Bill from the perspective of their necessity and significance in the current Indian R&D environment. Part B highlights the ambiguities in several defined terms in the Bill. Part C discussed the substantive provision of the Bill, considers how these provisions might impact the current innovation environment in India and suggests certain modifications.

Objects and Reasons

Uniformity and Predictability[13]

While several government policies and guidelines now give greater autonomy to recipient institutions to protect, own and commercialize any IP resulting from public funded R&D, significant uncertainties continue to exist. Establishing a clear policy by way of codification of existing best practices would serve the important function of making applicable rules more uniform and predictable across the board.

The Bill introduces this much-needed uniformity and predictability by permitting recipient institutions to elect to retain title over IP resulting from public funded R&D. It does so by, *inter alia*, requiring the government to publish any decision to refuse the title to the recipient in the official gazette within 90 days of receipt of intimation from a recipient so electing to retain title. However, several adjustments and support mechanisms are necessary for practical realization of this objective.

Creating and Commercializing Public Funded IP

One of the key aims of the Bill is to encourage creation and commercialization of IP generated using public funds.[14] More specifically, the Bill seeks to encourage creation of IP and promote a culture of innovation and technology transfer in India by (i) permitting recipients of public funds (recipients) to elect to retain title over the IP generated using such public funds (clause 5); (ii) requiring recipients to apply for protection of such IP within statutorily specified periods (clause 7), and (iii) mandating that recipients share the income generated as a result of transfer of 'public funded IP' with the creator/inventor of such IP (clause 11).

The above provisions are indeed laudable in their intent: Prior to the enactment of the BDA in the US, several perceived reputational and political risks prevented academic institutions from patenting and commercializing results of public funded R&D.[15] The BDA removed these fears by not only permitting, but encouraging universities and scientists to get involved in licensing and 'business' activities.[18] In India also, it is likely that with the enactment of Public Funded IP Bill, the taboos associated with academic involvement in 'business' will reduce, creating instead a sense of pride among scientists and institutions in protecting and commercializing IP generated from public funded R&D.

However, India not only has several incentive mechanisms for the creation of IP in the form of IP protection laws, but also has policies and regulations that permit recipient institutions to protect and commercialize IP generated using public funds and to share income generated thereby with the inventor/creator. In order to determine whether the proposed Bill would provide greater incentive for the creation, protection and commercialization of IP in and from public funded institutions (beyond what has been achieved under existing laws, policies and regulations), it is necessary to first study the present innovation environment in India, including (i) its public funded research system (ii) quality of research emerging from universities and educational institutions, (iii) monetary input being provided by the government for R&D (iv) current nature of government-academia-industry interaction, and (v)

ability of the domestic industry to absorb IP generated at the lab level.[16] These factors are examined hereunder.

(i) The Public Funded Research System in India

R&D in India happens at various levels, aided by various sources of funds. As per the directory of R&D institutions published by the Ministry of Science and Technology, there are about 3960 R&D institutions in India (including 2020 owned by the private sector).[47]

Allocation of funds to central government R&D institutions and universities is done under the annual budget as per the recommendations of the Planning Commission of India. The funds are thereafter disbursed through various ministries and departments of the central government depending on the nature of the receiving institution: universities and other institutions imparting higher education are funded either directly or indirectly through the Ministry of Human Resource Development (MHRD). Central government R&D institutions like the CSIR and the Indian Council for Agricultural Research (ICAR) receive their funding from various departments under the Ministry of Science and Technology, the Ministry of Agriculture and Co-operation etc. Thus, while educational institutions such as the Indian Institutes of Technology (IITs) also conduct R&D, the largest portion of their resources come not in the form of R&D funds but in the form of funds for higher education.

The distinction is relevant for the purposes of the proposed Bill, which only covers funding received for the purposes of R&D.[17] Central government 'grants' for R&D are received by educational and R&D institutions (and in some cases by the private sector) primarily in the form of 'extra mural research funds'.[18] The amount of funds disbursed in this form has been rising over the years. In 2005-2006, the amount of public funds disbursed as extra-mural funds was about 20% of the total government spending on R&D.[19] Universities and educational institutions received only about half of these funds (approximately 10% of the total).[19] The other half was disbursed to government research labs, such as those under the CSIR, or to triple helix collaborations, which include private industries. More importantly, however, almost 50% of the total extramural funds were disbursed by the DST under its liberal guidelines that already permit the recipient institution to protect and license out IP created using these funds and require them to give up to 30% of the earnings to the inventor/ scientist.

The remaining 80% of the country's R&D budget goes to various government-funded research institutions that fall within the purview of various departments and ministries. A closer look at the statistics reveals that only about 20% of the total public funds earmarked for R&D are available for 'civilian research'.[20] According to the latest available government data, more than 50% of the total R&D expenditure is incurred for defense and space research alone (most of which would likely be non-patentable under the provisions of the Indian Patents Act, 1970).[21] Privately funded studies estimate that of the 20% available for 'civilian research', about 8% goes to CSIR, 4% to the institutions under ICAR, 4% to the applied research programmes of DST and 1% to the Indian Council for Medical Research (ICMR).[22]

Most of these research institutions are autonomous and already enjoy almost complete discretion to protect and commercialize IP resulting from research conducted using public funds. From the perspective of these research institutions therefore, the provisions of the Bill may, to a large extent, be mere restatements of existing policies. For example, institutions such as the CSIR do protect and license out IP created in their network of laboratories: According to official sources, as of 2008, 1926 patents owned by CSIR were in force, 5.7% of which were being utilized. An additional 3245 patents were under prosecution, of which 1.94% had been licensed and utilized.[22] There is therefore no question of uncertainty as to ownership of this IP; neither is there currently any rule preventing commercialization.

While not all Indian R&D institutions have had similar success in creation and commercialization of IP, one may legitimately wonder in the light of the CSIR statistics and in the light of the absence of policies preventing protection and commercialization of IP, whether the lack of a suitable 'incentive system' is the key problem that needs to be addressed to spur innovation in public funded research institutions in India.

(ii) Industry-Academia Interaction

An issue closely related to the segregated structure of R&D and higher education in India, is the issue of industry-academia interaction. A healthy interaction between academic institutions conducting public funded R&D and the industry is a pre-requisite to

transfer of technologies from the public to the private sector. However, the current state of industry-academia interaction in India leaves much to be desired. While documented studies on industry-academia relationship in India are not extensive, according to the 'Working Group Report on Strengthening Academia Industry Interface (including Public Private Partnership) for the XI Five Year Plan' prepared for the Planning Commission in 2006 (Working Group), 'industry-academia interface' has not achieved its full potential in India because of 'basic attitudinal differences and perceptions of technology development between two sides.' [23]

From a historical perspective, one of the key reasons for this weak relationship is almost complete segregation of core 'R&D' activities from core 'teaching' activities. The former (R&D) was placed largely under the exclusive domain of specialized R&D institutions established following India's independence. The latter (teaching) was the exclusive domain of Indian universities and educational institutions, where the curriculum was designed to encourage them to impart 'pure' education and refrain from undertaking any significant R&D activities.[24] Most Indian educational institutions have therefore traditionally engaged themselves only with very rudimentary laboratory based training and looked down upon anything that could be classified as research undertaken with monetary incentives or for commercial gains.[25] Not surprisingly, higher education contributes only about 4% to the total expenditure incurred by India for R&D.[20, 26] While there is scattered evidence of improvement in industry-academia interaction, it is limited to a few well-funded institutions such as the IITs.

(iii) R&D in Indian Institutions

At the time the US introduced the Bayh-Dole Act, its universities were already involved in cutting edge R&D activities and the US government alone held more than 28,000 patents.[27] Furthermore, numerous universities had already established Technology Transfer Offices (TTOs) as independent organizations outside the university structure and a strong IP system had been in place and running efficiently for decades.[16] In India, on the other hand, while the Government does own patents, the numbers are significantly lower. As of March 2008, less than 30,000 patents (in total) were in force in India.[28] While this number is expected to shoot up significantly in the coming years, domestic entities, (i.e. industry, universities and R&D institutions) hold only about 28% of the total patents currently in force.[29]

Within this 28%, while the largest number of patents is held by a government funded research institution, namely, the CSIR, the number of patents held by most other Indian public funded institutions and universities is minute, and in several other instances, nil. While the trend increase in this number is significant when academic institutions are studied as a group, the corresponding numbers in individual educational and scientific research institutions are very low, particularly in institutions other than the world famous IITs, the Indian Institute of Science (IISc), and the CSIR (Table 1).[30] Furthermore, the concept of TTOs is known and accepted only by a few educational and R&D institutions in India.

Most significantly perhaps, it must be noted here that trend growth in R&D activity is different from trend growth in technology transfer. The BDA significantly increased the technology transfer and commercialization trends in the US; robust R&D activity leading to creation of IP pre-dated the enactment of the BDA.[33] The aim of encouraging creation of IP via a legislation inspired by the BDA may therefore be misplaced. Indeed, considering the fact that most Indian educational and R&D institutions are currently not creating technologies that require or merit IP protection and subsequent transfer suggests that the proposed Bill may not have the same impact in India as the BDA had in the United States.[2]

Table 1 — Patent filing by key government funded departments/institutions

Department/institution	No of published patent applications (2005- 2008)[31]	No of patents granted (2002-2007)[32]
Defense Research & Development Organization (DRDO)	83	10
Department of Information Technology (DIT)	N/A	03
Indian Council for Agricultural Research (ICAR)	82	Nil
Indian Space Research Organization (ISRO)	67	Nil
Council for Scientific & Industrial Research (CSIR)	1523	1000
Department of Science & Technology (DST)	N/A	36

One might of course legitimately argue that the number of patents filed or granted is not the only (or even the most reliable) means of determining the innovative activity in a country. Indeed, scientists are well known for their inclination to publish rather than patent their research findings. A glance at the impact of research publications emerging from Indian universities and research institutions may therefore be relevant: According to a recent study comparing the impact of publications from China, EU, India, Japan and USA for period 1981-85 to 2000-04, while the impact of publications from China rose from 25 to 60 (with the corresponding world-wide mean being 100), 'the impact for India was more or less stable at around 55 for the entire period with a small increase at the end, reaching 60 in 2000-04'.[34] It bears noting that the corresponding impact of publications from the US was very much higher at around 120 at the time the BDA was enacted, and has neither increased nor decreased significantly following its enactment.[35]

Almost paradoxically, a great deal of technology transfer has taken place from a few Indian academic and research institutions without underlying IP protection. The Indian agricultural research sector, consisting of the ICAR and the network of State Agricultural Universities (SAUs) is perhaps the most important case in point. According to several research estimates, ICAR conducts about 43% of the research done in India in the field of agriculture.[36] In addition to directly transferring know how generated from its research to farmers, the public research sector in India has also been the key source of inbred lines for the private sector seed industry.[37] Experts opine that the success of private sector research in the agricultural sector is a direct result of the strong research base in the public sector.[38] It is likely that because of the pre-existing innovative environment in ICAR and CSIR, these institutions may benefit from the added incentive mechanism offered by the proposed Bill.

In most other R&D institutions and universities however, innovation environment is in its nascent stages of development. In these institutions, in the absence of an overall environment enthused about IP creation, a law encouraging technology transfer from the public to the private sector would remain largely redundant.

(iv) Public and Private Spending in R&D

It has been suggested by observers that Bayh-Dole style legislations would be particularly useful in fostering innovation and technology transfer in developing economies that invest significant funds for R&D activities in universities and laboratories.[1,2] Without adjusting for inflation, the Indian government's allocation of funds to scientific departments was doubled from about Rs 12,000 crore in the IX Plan[39], to about Rs 25,300 crores in the X Plan[40] and almost tripled to Rs 75,304.00[41] crores in the XI (present) Plan.[42] Furthermore, according to recent World Bank studies, India's R&D spending in PPP (purchasing power parity) terms made it the world's 9th largest spender on R&D in 2004.[43] (This rank reflects the lower cost of India's R&D spending relative to OECD countries).[44] However, over the past 20 years, India has invested no more than 0.9% of its GDP on R&D.[21] Compared to the 1.23% by China, 2.64% by Germany and 5.11% by Israel; India's investment in R&D appears to be significantly low.[45] Furthermore, India's per capita R&D expenditure is only $5.90 which is significantly lower than several other developing countries, particularly China ($12.15) (Chapter VIII in R&D Statistics: GoI). [22]

Under its S&T Policy, 2003, India planned to increase its R&D expenditure from 0.8% to 2% by the end of the 10th plan. This was to be achieved with the help of private sector. Currently, domestic R&D spending is dominated by the public sector (a trend which is typical at early stages of innovation[46]), with the private sector contributing less that 1/3rd to the total R&D expenditure in India[47]: 75-80% of the domestic R&D spending comes from the public sector, 20-25% from private enterprises and 3-4% from universities.[20, 45] While private sector R&D expenditure in India has increased significantly following liberalization of the Indian economy in the 1990s, this increase is most significant only in sectors where India is facing strong competition from MNCs.[48]

It is not clear whether a legislation modeled on the BDA would help increase overall private spending in R&D. At the university level, as per studies conducted in the US, there was a decrease in industry financing and performance of R&D, especially at universities and colleges that established an office of technology transfer after the enactment of the BDA.[49] In other universities and colleges, 'industry funding as a percentage of R&D… fell throughout the 60s, bottomed in the late 60s or early 70s and has risen since then.'[49] The study concludes that this trend indicates that 'any growing industry influence (on R&D) predates the Bayh-Dole Act by a decade or more' and that '… the Bayh-Dole Act seems to have just re-enforced the existing trend of rising industry funding.'[50]

(v) Absorptive Capacity and Domestic Industry

Increasing private funding within universities and public funded R&D institutions however, is not, and probably should not be one of the aims of the proposed Bill. In fact, such funding might suggest a rising industry 'influence' over public funded research, which may not be desirable from a larger public interest perspective. However, the current low levels of R&D spending by the industry are a concern because they indicate low levels of in-house R&D activity, thereby suggesting inadequate or underdeveloped absorptive capacity, and an overall disinterest in innovation.

Although recent studies suggest that private spending in R&D has increased in the past few years,[51] this increase can be attributed almost exclusively to increase in R&D expenditure by MNCs and foreign firms and not to an increase in in-house R&D by domestic firms. Trends in patent filing at the Indian Patent Office (IPO) support this fact: MNCs and foreign entities are significantly more active in filing patents in the IPO than domestic firms; only four Indian entities appear in the list of top 50 patent filers in the IPO, namely, CSIR, IITs, Dr Reddy's Labs and Ranbaxy.[52]

Admittedly, it is not clear whether the patents filed by MNCs in India are a result of R&D conducted in-house by their Indian branches/subsidiaries or by their parent/sister companies abroad. However, dominant position of MNCs in relation to patent filing treads clearly suggests that given their greater technological and economic prowess, foreign corporations/MNCs are in a much more powerful position to 'influence' R&D at Indian universities and R&D institutions than their domestic counterparts. It is at least plausible that the interests of foreign enterprises would not match the urgent needs of the Indian people; needs which public funding ought to satisfy on priority. Indeed, several authors have suggested that India beware of negative externalities associated with increase in R&D spending by MNCs; including diverting talent away from India-specific R&D needs.

At the same time, several major private domestic players such as Ranbaxy and Dr Reddy's Lab have also invested most, if not all, efforts (and funds) to developing drugs that find larger markets in developed countries. There is therefore an urgent (and perhaps primary) need for India to adopt measures to encourage its domestic industry (including SMEs and start-up companies) to (i) invest in in-house R&D aimed at fulfilling India-specific needs and (ii) improve its absorptive capacity. While these goals are still distant, a legislation modeled on the BDA would not help direct public funds to increase India-specific innovation.

Encouraging Innovation in SMEs and Triple Helix Collaborations

In the light of the above discussion, it is surprising that the proposed Bill neither mandates nor encourages transfer of public funded IP to start-ups (several of which are incubated in premier Indian universities), Small and Medium Enterprises (SMEs) or even to the domestic industry. So long as the industry is located in India or has a place of business in India, it would not be disqualified from acquiring non-exclusive or even exclusive licenses to IP generated using public funds (clause 5 proviso 2, clause 12). Absent legislative support to domestic SMEs and given superior absorptive capacity of MNCs, it is likely that most of the IP generated using public funds would be absorbed by the latter.

While absorption of Indian public funded IP by foreign corporations may not be entirely undesirable, it is necessary that the Bill strikes the right balance between encouraging growth of domestic SMEs and accepting foreign know how and resources to ensure that public funds are utilized for inclusive and well rounded growth of all sections of Indian society. One may argue that despite absence of explicit language, universities would be compelled to transfer technology to start ups and SMEs as these are considered to be the best suited for scaling up lab level technologies.[53] However, given the low availability of seed capital and other resources among start-ups and SMEs in India and the fact that the Indian seed and venture capital industry is in its early stages of development, it may be desirable to (i) encourage collaborations between start-ups/SMEs and large corporations and (ii) introduce concrete provisions within the main text of the Bill to incentivise technology transfer to domestic firms, SMEs and start ups on preference, rather than merely mentioning the encouragement of innovation in SMEs as one of several goals in its statement of objects and reasons.[54,55] Inclusion of such provisions would better encourage domestic firms to invest in in-house R&D and increase their absorptive capacity, and would also propel university spin-offs and triple helix collaborations. Absent such provisions, the Bill would provide little impetus to industry-academia interaction (beyond the limited incentive provided by the clearer titles to the IP generated using public funds). Alongside, the government must continue to provide funds for projects that address India specific needs.

Enhancing IP Awareness

Another key object of the Bill is to 'enhance awareness about IP issues, particularly in universities, academic and research institutions' and to 'increase the responsibility of universities, academic and research institutions to encourage students, faculty and scientists to innovate.'

Effectively utilizing the fact that the central government departments and ministries provide funding to a large number of academic and research institutions across the country every year, the Bill requires each institution receiving such funds to constitute an Intellectual Property Management Committee (IPMC) within 180 days of receiving public funds for R&D (clause 10). The Committee is then required to establish mechanisms to promote culture of innovation and generation of IP within the organization (clause 10(2)(f)).

Adequately implemented, it is likely that this provision of the Bill will prove instrumental in compelling institutions that have thus far remained immune or indifferent to IP creation and management, to educate its students, faculty and scientists in this regard. In the near future, this might be one of the most important contributions of the Bill to the Indian innovation system.

However, in order for this provision to be truly effective, it is important to ensure availability of trained persons to man (i) the IPMCs and technology transfer offices of all recipient universities and institutions, and (ii) government offices receiving and reviewing the requests to retain title (clause 4 & 5). Indeed, one of the key reasons why the impact of the Bill may be low in the short term is that it has been drafted on the presumption that scientists and students at recipient institutions are well versed with subject matter and criteria that make an invention/IP eligible for various forms of protection. This is currently not true for India. Comprehensive and frequent 'awareness creation' and educational seminars will be needed to achieve this goal.

Promoting Access to Innovation for All Stakeholders

Critics caution that in its current form, the Bill may lead to situations where the universities will protect/patent all inventions without considering whether such protection would serve or hinder the larger objective of access to innovation.[56] The limited experience of several Indian public funded labs that have successfully transferred technology to the industry without IP protection strengthens the argument against mandating IP protection for all public funded inventions. While the government has the right to refuse retention of title by the recipient in some circumstances (clause 5 and provisos), it may be noted that government agencies in India may not be in a position to make informed choices in this regard, not least because of the variety of technologies for which funding is provided and the expertise required in the specialized disciplines to make an informed decision.

One way of helping the government agencies make an informed choice would be to require recipient to disclose (while electing to retain or not retain title over the intellectual property generated) reasons for protecting and retaining title over IP created using public funds including how and why such protection is necessary for technology transfer and subsequent commercialization.

It has also been suggested that the Bill permit the inventor or creator of the IP to decide whether to protect and license the IP or place it in the public domain.[57] In the present version of the Bill, the inventor/creator appears to have little or no say in the decision making process. At the same time, it is also pertinent to note that the Bill does not permit the creator/inventor to apply for and retain title to the IP resulting from public funded R&D in the event that the recipient (university, public funded lab etc.) elects not to retain title.

Under a previous version of the proposed Bill, it was not clear whether government funded autonomous institutions such as the CSIR would fall within the ambit of the Bill.[58] The latest version of the Bill has made significant modifications in the definition of the 'recipients' making it broad enough to include all autonomous institutions and statutory bodies engaged in R&D and receiving public funds therefor. While the inclusion of autonomous societies such as the CSIR and ICAR within the ambit of 'Recipient' makes the real impact (in money terms) of the proposed Bill appear more significant, the added impact that this inclusion would have on innovation within such recipient institutions is not clear in the light of the autonomy already enjoyed by most of these institutions to create and transfer public funded IP (as discussed above).[59]

On the contrary, such inclusion has raised issues about ability of these institutions to dedicate their inventions to the public, if they so choose.[60] While the

Bill does not require recipient to elect to retain title in all circumstances, given the economic incentives in the Bill and stated objective of 'minimizing dependence of universities, academic & research institutions … on government funding,' it is likely that monetary gains rather than larger public interest will determine a recipient's decision to retain or forfeit title over public funded IP.[16] In this context, it may be relevant to note that the ICAR promulgated its Guidelines for IP Management and Technology Transfer/Commercialization in 2006, where under, it states that 'Depending upon factors such as the nature of technology, public need or marketing prospects, scale of technology etc., a decision will be taken by the competent authority whether the technology will be placed in the public domain through open access, or it will be transferred to end-users through commercialization.'[61] Such intra-agency rules ought, in fact, to be encouraged in larger public interest while educating scientists about the importance of IP creation and protection and associated pros and cons.

Promoting Self Reliance

Another aim of the proposed Bill is to reduce dependence of university and R&D institutions on government funding. Evidence from the US however suggests that most TTOs in universities run losses and do not get the kind of revenue that one may expect despite numerous successful technology transfer initiatives.[62] Accordingly, this may be an unrealistic goal to pursue, especially in the short term. More importantly, the government must determine whether this is a worthy goal to pursue; funding for R&D, especially R&D which may not be of interest to the industry, but is necessary for the growth of the frontiers of science and in some instances, for betterment of societal health and welfare must continue to come from the government, and in optimal quantities.[63]

India should also consider the fact that the BDA in general and rising private funding of academic research, in particular, has been associated with and criticized for changing the nature and trends in R&D at academic institutions, with an increasing de-emphasis of basic research in favour of more income promising applied research.[16] While a number of scholars have provided empirical data in support of or against this criticism, on its own, it may not be a good enough reason for developing countries to avoid enacting legislations similar to the BDA. Instead, it may be more advisable to work appropriate provisions into the Bill to avoid such eventualities. At the same time, in the Indian context, considering the lower level of government funding given to basic research (when compared to applied research), measures to increase this funding may be necessary independent of any decision to adopt (or not adopt) a Bayh-Dole style legislation.[21, 64, 65]

Definitions and Scope of the Bill

This part discusses the ambiguities inherent in the definitions of some of the key terms in the proposed Bill.

Public Funded Intellectual Property

The Bill defines intellectual property under clause 2 (c). Most alarmingly, the Bill defines 'intellectual property' to mean 'intellectual property right;' thereby failing to note or over looking the fact that the existence of a 'right' can be determined only after going through several statutory procedures. Thus for example, an invention would be an IP, but a patent that might be acquired after going through the rigorous examination procedures of the Patents Act, 1970 would be an intellectual property right. By defining 'intellectual property' to mean 'right to intangible property,' the Bill creates considerable confusion (for example *vis-à-vis* reporting requirements) under the Bill.

Furthermore, the Bill goes beyond the scope of the US BDA by including within its purview not only patents, but several other types of IP including trademarks, copyrights, designs, plant varieties and semiconductor layout-designs. The rationale for including some of these is not clear. Copyrights may of course have been included with the aim of bringing computer programs made using public funds within the purview of the Bill. However, one is hard pressed to imagine why other copyrightable works, notably scientific publications, would need to be covered within the purview of the Public Funded IP Bill. In this context, it is necessary to remember the fact that copyright protection is automatic under the Indian law. Therefore, requiring works protectable by copyrights to be put through the cumbersome procedures of the Bill would only result in significant delays in publication of articles and dissemination of the underlying technology and information, thereby defeating one of the key objectives of the Bill.[57,66]

Most intriguing perhaps is the inclusion of 'trademarks' within the purview of the Bill. First, it is difficult to imagine a situation where a 'trademark'

would be created using public funds, unless one is considering institutions such as the National Institute of Design and the National Institute of Fashion Technology. Even if one were to imagine this situation, one is hard pressed to imagine how and why there would ever be a pressing need to transfer the said 'trademark' created using public funds to the industry. It is equally difficult to fathom how such a transfer, even if it does occur, would further any of the key objectives of the Bill. The wording and scope of the term 'intellectual property' must therefore be thought out more carefully. In its current form, it may be single handedly responsible for slowing or shutting down a large number of innovative and creative activities in the country.

Recipients

Under the US Bayh-Dole Act, the term 'non-profit organization' has been defined to mean (*inter alia*) universities.[67] The Indian draft Bill does not define a 'Non-profit organization,' but defines 'recipient' to include 'universities or institutions of higher learning established for research purposes… and includes an organization established by an act of parliament or a non-profit scientific or educational organization registered under the Societies Registration Act, 1860.'

The inclusion of 'societies' in the above definition appears to be aimed at covering R&D institutions such as the CSIR and ICAR, which are 'autonomous institutions.' While practical impact of this inclusion is not clear, it may lead to the addition of at least one more bureaucratic step: As per Rule 208(vii) of the General Financial Rules, 2005 government departments are required to enter into a Memorandums of Understanding (MoU) with the concerned ministry or department spelling out clearly the output targets in terms of details of their program of work and qualitative improvement of output, along with commensurate input requirements. It is likely that these autonomous institutions will, in addition to or as part of the MoU signed with the government, now have to execute a 'funding agreement' under clause 3 of the Bill.

It is necessary to also give these institutions considerable discretion and incentive to disseminate the IP created using public funds to the society or the industry without seeking IP protection or by giving out royalty free non-exclusive licenses, if such dissemination is possible and desirable in greater public interest.

Other Substantive Provisions

Reporting Requirements

The bill contains a number of reporting requirements that could potentially discourage recipients from electing to retain title over the public funded IP. These provisions could also be a nightmare for any technology transfer office and the government agency evaluating the intimations regarding elections to retain title.

(i) Ambiguity

Clause 4 of the Bill requires recipients to make a disclosure of any intellectual property resulting from public funds to the government within sixty days of actual knowledge of the public funded intellectual property. What amounts to 'actual knowledge of public funded IP' is however not clear, especially in the light of the ambiguous definition of IP and 'Public Funded IP'.[68] While it may be gathered from other provisions of the Bill (e.g. clause 7) that the recipient is required to report to the government under Section 4 before electing to retain title and before applying for IP protection, it may be advisable to clarify the definitions in the Bill.

Similarly, within 90 days following the disclosure under clause 4, the recipient is required to elect whether or not it wants to retain title over the IP. Here again, the use of the term 'retain' suggests that IP rights have already been acquired. However, clause 7, which requires recipients who have elected to retain title to apply for protection of IP, suggests that election preceed application for protection.

(ii) Wide Discretion to Deny Title

The second proviso to clause 5 of the Bill gives the government wide discretion to deny title to the recipient on certain grounds, including

(b) that in the public interest and in exceptional circumstances, the government deems it expedient so to do;

This section corresponds to §202 (a) of the Bayh Dole Act, with important differences: There are no detailed requirements to submit a copy of the determination to refuse retention of title to the Minister of Commerce (or any other person) as is required under §202(b)(1) of the US Bayh-Dole. Further, the notice of denial is not given to the recipient, but published in the official gazette (clause 5). For purposes of efficiency and to avoid any confusion at the recipient's offices, it may be better to notify the recipient directly (if necessary, in addition to publication in the official gazette).

There is also no express provision permitting the recipient to challenge the decision of the government agency. While Article 226 of the Indian Constitution permits persons aggreived by government orders to file a writ petition in the appropriate High Court (absent any specific remedy in the statute concerned), given the necessary expertise required to make such decisions, it may be better to assign disputes arising under this section to the Intellectual Property Appellate Board (IPAB) (§ 116 of the Patents Act, 1970) or other specialised tribunals.

The wording of the proviso is also too broad, conferring almost unfettered discretion in the hands of government agencies: While the Bill requires denials based on public interest to be made only in 'exceptional circumstances,' there are no requirements to furnish reasons for refusal. At the same time, optimal utilization of this discretion would require concerned government departments to be manned by highly trained officials; an ideal that may take some time to be achieved.

Bar on Public Disclosure

Clause 6 of the Bill prohibits public disclosure, publication or exhibition of public funded IP till an application for the protection of the same has been made. This provision appears to be drafted keeping in mind the novelty requirements under the patent law. However, it fails to take into account the Bill's all encompassing definition of 'intellectual property', which includes copyrights, plant variety protection and several other types of IPRs. While the importance of this provision from the perspective of patents is understandable, its applicability to other forms of IP including scientific publications is indeed worrisome. As was noted by an expert on the US BDA, 'there is nothing under Bayh-Dole that is an equivalent and, in fact, attempt by US universities to discourage timely publication or to agree to confidentiality of research in university-industry agreements is met with disapproval. Again, in an academic environment built around openness, where educating students is the primary purpose, the requirements of the Bill would be technically impossible to comply with.[69] It is therefore necessary to limit the scope of this section to patents in order to ensure speedy dissemination of knowledge from universities and public funded institutions.

IP Management Committee

Clause 10 of the Bill requires that every recipient constitute an IPMC within its organization. IPMCs are required to perform the functions performed by TTOs, including identifying, assessing and protecting public funded IP, performing market research, monitoring the process of licensing and assignment and managing revenues from licensed public funded IP. In addition to these responsibilities, IPMCs must also be required to undertake the task of imparting IP education to students and scientists. At present, most institutions of higher learning do not have such committees and establishing them within every recipient institution would go a long way in increasing IP awareness. However, trained and experienced personnel are necessary to successfully run such IPMCs.

Preference for National Industry

Clause 12 of the Bill corresponds (roughly) to §204 of the Bayh-Dole act and requires that no exclusive rights (over the IP created using funds given under the terms of this Bill) be given to any person 'unless such person manufactures products using such public funded intellectual property, substantially in India.' A proviso to the section however states that the government may allow such exclusive rights to be given for manufacture in countries other than India for reasons to be recorded in writing. No guidelines have been given to the government regarding the circumstances in which such permission may be given. This again, gives a very wide discretion to the government and may amount to excessive delegation. It would therefore be prudent to insert a provision as existed under the previous version of the Bill, under which the requirement to give preference to the National industry could be waived 'upon showing by the recipient(s) or assignee that reasonable, but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in India or that under the circumstances domestic manufacture is not commercially feasible.[57] More importantly however, as discussed before, this provision should encourage transfer of public funded IP to domestic SMEs and start-up companies whenever this is feasible.

Compulsory Licensing and March-in Rights

As per clause 13 of the Bill, the government has the right to practice or assign any public funded IP to carry out its obligations under any international treaties or agreements. Barring this one provision, nothing in the Bill details the rights of the government to 'march-in' in case of non-working or other lacunae.

Neither does the Bill state that the government retains a 'royalty free non-exclusive license' to use the patent for the purposes of the government. While the compulsory licensing and government use provision of the patents act may suffice with regard to the patents resulting from public funds, other acts that are included within the ambit of the Bill, such as the copyright act, do not contain such elaborate compulsory licensing and government use provisions. It is necessary to include a clause that states either that the compulsory licensing and government use provisions, as under the patents act, would apply to all forms of public funded IP, or introduce a section similar to the 'march-in' rights provisions of the BDA.

Penalty Provisions

Clauses 20 and 21 of the Bill introduce penalties for failure to comply with the requirements of the Bill, perhaps with the aim of ensuring that recipients and scientists take the provisions of the Bill seriously. However, their extreme harshness could potentially be a major disincentive for recipient institutions and scientists of these institutions to undertake government funded R&D projects. Furthermore, the provision (clause 20) imposing a fine that may extend to 25% of the amount of grant received, seems unreasonable and impractical, not least because of the current salary levels of scientists working in R&D institutions and universities of India.

The penalty provisions may also be struck down as being unconstitutional; no distinction in the type or amount of penalty has been envisaged on the basis of severity or consequence of the default. For example, it would be arbitrary and unreasonable to 'recover the amount of grant already released with interest at the rate of 10% per annum' and to bar such recipient from future grants in such circumstances if no real harm or loss resulted from a default. Even if the failure to comply with the requirements of the Bill leads to considerable losses, imposition of such penalties would not be justifiable absent evidence of mala fides. Retaining penalty provisions of this nature in the Bill could have a severely negative impact on the R&D and innovation system of India.

Conclusion

A Bill similar to the BDA would likely help make the practices of government departments more uniform, and would also help remove the taboos associated with university involvement in 'commercial' activity, particularly technology transfer to the industry. Furthermore, mandating the establishment of IPMCs would help create awareness about IP and enthuse scientists to create, protect and transfer technology. However, given the current innovation environment in India, the Bill would likely be premature; R&D infrastructure in its universities, R&D ethos of several of its R&D institutions, absorptive capacity of its domestic industry, availability of seed capital for entrepreneurship as well as the overall awareness about IPRs needs to be strengthened considerably before a system as envisaged under the proposed Bill can have a real impact. Given the immense resource base required to establish, maintain and effectively run the executive machinery under a new legislation, in the short run, it may be better to pursue this objective by amending the GFR, 2005 to require government funding agencies to permit recipient institutions to protect, own and license IP resulting from government funded projects.

If India would nevertheless like to proceed with the enactment of the proposed Bill, the following amendments would perhaps be necessary to ensure that its provisions are not counterproductive:

1 The definition of the term 'intellectual property' in the Bill needs to be thought out more carefully. In its current form, it is ambiguous and may lead to contradicting interpretations of various provisions of the Bill. The utility and possible impact of including copyrights and trademarks within its scope must also be re-considered.
2 Clause 4 of the Bill (in the light of the definition of 'intellectual property') needs to be cured of its terminological obscurities.
3 The reporting requirements under the Bill are extremely complicated and ambiguous. These need to be reconsidered and simplified.
4 The wide discretion given to the government to deny title to the recipient institution must be tempered with appropriate guidelines within the Bill.
5 The bar on public disclosure under clause 6 of the Bill must be limited only to cases where the public funded IP is a patent. In its current form, it may delay publication of information coming out of universities, thereby defeating the Bill's 'access to innovation by all stakeholders' objective.

6 In Clause 12, specific guidelines must be given for circumstances in which exclusive rights can be given for the manufacture of products using public funded IP outside India. Transfer of public funded IP to start-ups, SMEs and the domestic industry must be encouraged.

7 The penalty provisions of the Bill in their current form, are a major disincentive for scientists and research institutions to take up public funded R&D projects.

8 The Bill must mandate extensive and coherent collection, reporting and publication of all relevant data including the number of technologies created, types of IP acquired, manner of transfer of technology, entity to which technology is transferred etc. Such reporting is necessary to evaluate the success and continued need of the Bill.

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2 Boettiger Sara and Bennett Alan, Bayh-Dole: If we knew then what we know now, *Nature Biotechnology*, 24(3) (2006) 320; Boettiger Sara and Bennett Alan, The Bayh-Dole Act: Implications for developing countries, IDEA*: The Journal of Law and Technology*, 46 (2006) 271-273.

3 Throughout this paper, 'the Bill' or the 'Public Funded IP Bill' refers to The Protection and Utilization of Public Funded Intellectual Property Bill, 2008 (Bill No. LXVI of 2008), *www.indiarnd.com/protection-bill.pdf (28 August 2009).* For another perspective on the Bill, see Vivekanandan V C, Transplanting Bayh-Dole Act – Issues at stake, *Journal of Intellectual Property Rights* , 13(5) (2008) 480-485.

4 The Indian Patents Act, 1970 (Act No. 39 of 1970), the Indian Copyright Act, 1957 (Act No. 14 of 1957), the Protection of Plant Varieties and Farmers Rights Act, 2001 (Act No. 53 of 2001) etc.

5 Indian Contracts Act, 1872 (Act No. 9 of 1872).

6 The Science and Technology Policy, 2003 (Ministry of Science and Technology, Government of India, 2003), http:// www.dst.gov.in/stsysindia/stp2003.htm (15 August 2009).

7 Scientific Policy Resolution, 1958 (Government of India) New Delhi, the 4 March 1958, http://www.dst.gov.in /stsysindia/spr1958.htm (15 August 2009).

8 The Technology Policy Statement, 1983 (Ministry of Science and Technology, Government of India), http:// www.dst.gov.in/stsysindia/sps1983.htm (15 August 2009).

9 General Financial Rules, 2005 (Government of India) (GFR 2005). Rule 215(3) 2) of the GFR 2005 provides that on the completion of the project or scheme, the Ministries or Departments concerned will decide whether the assets can be retained by the implementing agency or returned to the sponsor. However, current trends suggest that most recipients do not concern themselves with seeking permission to retain title to any intellectual assets generated using public funds.

10 Clauses (xiv), (xix) and (xx) of Terms and Conditions of Department of Information Technology's funding agreement (Copy on file with author).

11 *mnes.nic.in/r&d/rnd-gtt-a15.pdf* (12 August 2009).

12 Annexure I of the Guidelines for Awareness, Protection and Management of Intellectual Property Rights (IPRs) in the University System in India, *University Grants Commission, Government of India* (August 2005), which states: '[r]ecently the government funding agencies under an instruction from the government of India have decided not to stake any claim on an invention made by a University scientist working under sponsored research project.'

13 While this is not one of the stated objectives of the Bill, it is one of the implied objectives as the Bill seeks to 'develop a framework in which protection and utilization of IP is put in place.' Several observers have also opined that this would be one of the key achievements of the Bill; Kochupillai Mrinalini, The Public Funded R&D Bill: Does India need a Bayh Dole? *SpicyIP India Blog*, (7 July 2008), http://spicyipindia.blogspot.com/2008/07/public-funded-r-d-bill-does-india-need.html (11 February 2009).

14 The Statement of Objects and Reasons of the Bill states that 'The proposed legislation… provides incentives to create intellectual property and the mechanism for its protection and utilization….'

15 Sampat B N, Patenting and US academic research in the 20th Century: The world before and after Bayh-Dole,' *Research Policy*, 35 (2006) 772-789.

16 It has been suggested that several of these factors and more were present in the US before the enactment of the Bayh-Dole and may not be present in developing countries, thereby making developing country scenarios unsuitable for a Bayh-Dole style legislation; Boettiger Sara and Bennett Alan, The

Bayh-Dole Act: Implications for developing countries, *IDEA: The Journal of Law and Technology*, 46 (2006) 271-273.

17 Clause 3 of the Bill which states that 'any recipient interested in taking a grant from the government for the purpose of R&D shall enter into an agreement with the Government before receipt of such grant.'

18 Extramural Research Funds are awarded under various schemes promoted by the government on the basis of elaborate selection processes. Extramural R&D is a sub-set of a much larger Public Funded R&D set.

19 For extramural funds data for the year 2005-06, see Chapter 7: National Science And Technology Management Information System (NSTMIS) in the Annual Report of the Department of Science and Technology, Government of India (2007-2008) *[NSTMIS-DST],* which states that the total approved cost for all extramural research projects during this year was Rs1163.80 crores (approximately €165.85 million as of August 2009). In the year 2005-06, the planned expenditure was approximately 1/5th of the total amount earmarked for R&D in the Xth 5-year plan (Rs 25,300 crores for the period 2002-2007, i.e. approximately € 3.5 billion as of August 2009), viz. about Rs 5060 crores (approximately €720 million as of August 2009).

20 World Bank: *Unleashing India's Innovation: Towards Sustainable and Inclusive Growth*, edited by Mark A Dutz (The World Bank, 1818 H Street, NW Washington, DC 20433, USA), 2007, 62.

21 *Chapter 1: National Resources for Research and Development,* in *Research & Development Statistics 2004-2005* (National Science and Technology Management Information System, Department of Science and Technology, Government of India), September 2006.

22 Office of the Director General, CSIR.

23 *Working Group Report on Strengthening Academia Industry Interface (Including Public Private Partnerships) for The XI Five Year Plan* (Planning Commission, Government of India) , December 2006.

24 Desiraju Gautam R, Science education and research in India, *Economic and Political Weekly,* 43 (24) (2008).

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26 Contrast this with the 18% of total R&D expenditure incurred by universities in their respectiveOECD countries.

27 Henderson Jennifer A and Smith John J, Academia, industry, and the Bayh-Dole Act: An implied duty to commercialize (October 2002), www.cimit.org/news/regulatory /coi_part3 .pdf (12 February 2009).

28 36th Annual report relating to patents under Section 155 of the Patents Act, 1970 (as amended) in the Annual Report of the Office of the Controller General of Patents, Designs and Trademarks 2007-08, p.11.

29 Patent Office: AR 2007-08, according to which, of the 29,688 total number of patents in force in India as of March 2008, 21,722 were held by foreigners and only 7966 were held by Indians. While the current trend is more encouraging that the trend reported by Ayyangar in his 1959 review of the Indian patent system (where he found that foreigners held almost 90% of the total patents in force in India), there is much scope for improvement; Rajagopala Ayyangar N, Report on the revision of the patents law, (Government of India) 1959, p.13. It may be relevant to note here that Ayyangar found the corresponding figure (% of patents held by foreigners) for USA to be 13.2% and for Germany, 25.80%.

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31 More precisely, this data is from January 2005 to December 2007. Source: Patenting Landscape in India (Evalueserve Whitepaper), June 2008.

32 Rajya Sabha Starred Question No. 389: Foreign patents in scientific areas, by Shri Surendra Lath, answered by Minister of Science and Technology Shri Kapil Sibal on 0-04-2007, http:// dst.gov.in/ admin_finance/ rs_210/ sq389.htm (22 January 2009).

33 The post BDA increase in patenting activity has been attributed to an amalgamation of factors: the US Supreme Court's landmark decision in *Diamond* v *Chakrabarty* 447 US 303 (1980) and establishment of the Court of Appeals for the Federal Circuit which turned the temperament of US courts from being primarily anti to pro patents, etc; Mowery David C and Sampat Bhaven, The Bayh-Dole Act of 1980 and university-industry technology transfer: A model for other OECD governments? *The Journal of Technology Transfer*, 30(1-2) (2005) 115-127.

34 Larsen Peder Olesen *et al*., Scientific Output and Impact: Relative Positions of China, Europe, India, Japan and the USA (paper presented at the Fourth International Conference on Webometrics, Infometrics and Scientometrics & Ninth COLLNET) 26 August 2008, p. 7.

35 Fourth International Conference on Webometrics, Infometrics and Scientometrics & Ninth COLLNET in 2004, the impact of publications from the US continued to hover around the 120 mark.

36 SAUs perform about 33%, private sector about 16% and international centers about 8%; Evenson R E *et al*., Agricultural Research and Productivity in India (International Food Policy Research Institute), Washington DC 1999, p.11.

37 Evenson R E *et al*., Agricultural Research and Productivity in India (International Food Policy Research Institute), Washington DC 1999, p. 34 where he states in relation to pearl millet and sorghum: 'These private breeding programmes depend heavily on the Indian public sector and ICRISAT for inbred lines.'

38 Evenson R E *et al*., Agricultural Research and Productivity in India (International Food Policy Research Institute), Washington DC 1999, p.36 where he states: 'The history of private hybrids indicates that private research India is based on strong public-sector research.'

39 Approximately €1.7 billion as of August 2009.

40 Approximatley €3.5 billion as of August 2009; Lok Sabha Unstarred Question No. 848 on Promotion of science education and research posed by Shri Varkala Radhakrishnan and answered on 04-03-2008 by the Minister of Science and Technology, Shri Kapil Sibal' http://dst.gov.in/admin_finance/ls_13/unsq848.htm (10 January 2009).

41 Approximately €10.7 billion as of August 2009.

42 Lok Sabha Unstarred Question No. 1695 on Expenditure on science and technology posed by Shri Ajit Jogi and answered on 11-03-2008 by the Minister of Science and Technology, Shri Kapil Sibal, http://dst.gov.in/admin_finance/ls_13/unsq1695.htm (10 January 2009).

43 Although at nominal exchange rates, India's domestic R&D spending was just $5.4 billion in 2004, in Purchasing Power Parity (PPP) terms, it was $26.9 billion, World Bank: *Unleashing India's Innovation: Towards Sustainable and Inclusive Growth*, edited by Mark A Dutz (The World Bank, 1818 H Street, NW Washington, DC 20433, USA), 2007, 31.

44 In the same year, China was the world's third largest spender at 94 billion USD (in PPP terms) right after Japan and USA, and at the end of 2006, it was the second largest spender ($ 136 billion) for R&D after United States ($ 340 billion)., World Bank: *Unleashing India's Innovation: Towards Sustainable and Inclusive Growth*, edited by Mark A Dutz (The World Bank, 1818 H Street, NW Washington, DC 20433, USA) , 2007, 31.

45 *Research and Development in Industry: An Overview* (Department of Scientific and Industrial Research, Government of India), November 2007.

46 In OECD countries the distribution is 69% by enterprises, 18% by universities and 10% by government R&D labs. Similarly, in China, 65% of expenditures are undertaken by enterprises ; World Bank: *Unleashing India's Innovation: Towards Sustainable and Inclusive Growth*, edited by Mark A Dutz (The World Bank, 1818 H Street, NW Washington, DC 20433, USA), 2007, 32.

47 R&D Ecosystem in India (A report Commissioned by the British High Commission and the Canadian High Commission, Evalueserve), New Delhi, 2008.

48 According to recent reports, the most active industry in India, vis-à-vis patenting activity is the chemicals and drugs industry which was responsible for 33% of the total patents filed in the Indian Patent Office (IPO) in the year 2005-2006. The computers and electronics industry has the second position with 23% of the total patents filed; *Evalueserve: Patenting Landscape*, p. 3.

49 Rafferty M, The Bayh-Dole Act and University Research and Development*, Research Policy*, 37 (2008) 29-40.

50 Rafferty M, The Bayh-Dole Act and University Research and Development*, Research Policy*, 37 (2008) 36. Rising industry funding for R&D is also seen at Indian universities such as IIT-Kharagpur where private funding increased almost three fold from about 316 lakhs (i.e. approximately 453,000 Euros as of August 2009) in 2004-05 to about Rs 818 lakhs in 2006-07 (i.e. approximately 1.17 million Euros as of August 2009), Annual Reports, IIT-Kharagpur (2004-05 to 2006-07).

51 World Bank: *Unleashing India's Innovation: Towards Sustainable and Inclusive Growth*, edited by Mark A Dutz (The World Bank, 1818 H Street, NW Washington, DC 20433, USA), 2007, 32.

52 *Evalueserve: Patenting Landscape*, p. 4. Of these, Ranbaxy recently sold controlling stake to the Japanese company, Daiichi Sankyo; Jyothi Datta P T, Is sell-out the cure? *Business Line*, 27 June 2008, http://www.blonnet.com/life/2008/06/27/stories/2008062750010100.htm (5 January 2009).

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55 There is no provision in the draft Bill that mirrors §202(c)(7)(D) of the Bayh Dole Act, under which funding agreements with non profit organizations must have a requirement that 'except where it proves infeasible after a reasonable inquiry, in the licensing of subject inventions shall be given to small business firms.'

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58 Kochupillai Mrinalini, Good bye (With some more thoughts on Bayh Dole)*, Spicy IP India Blog*, 28 September 2008, http://spicyipindia.blogspot.com/2008/09/good-bye-with-some-more-thoughts-on.html (30 January 2009).

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60 'Not in public interest'*, The Wall Street Journal, Livemint.com*, 1 November 2008, http://www.livemint.com/ 2008/ 10/ 11002336/ 2008/ 11/ 01001052/Not – in - public-interest.html?d=2 (10 January 2009).

61 ICAR *Guidelines for Intellectual Property Managemen and Technology Transfer/Commercialization* (ICAR, New Delhi), 2006, p. 47.

62 So Anthony D *et al*, Is Bayh-Dole good for developing countries? Lessons from the US experience*, Public Library of Science (PLoS) Biology*, 6(10):e262, 2079.

63 Government funded basic and clinical research in India has, for example, been largely responsible for significant reduction in iodine deficiency related disorders in various regions of India; Pandav C S, Karmarkar M G and Kochupillai N, Recommended level of salt iodization in India, *Indian Journal of Pediatrics,* 51(1) (1984) 53-54;

Jayaraman K S, Iodized salt campaign succeeds in India, *Nature Medicine*, 2(55) (1993).

64 During 2002-03, the % share of the total expenditure devoted to basic research was 17.8% and that for applied research was 41.7%.

65 The S&T Policy, 2003 recognizes this need and calls for mechanisms to enhance funding for basic research. The Ministry of Human Resource Development also set up a special task force to, *inter alia*, assess the present state of basic R&D in India and make recommendations; *Report of The Task Force on Basic Scientific Research in Universities* (Ministry of Human Resource Development, Government of India), 2005.

66 In this context, it is relevant to note that a previous version of the Bill had specific provisions excluding copyrightable works from reporting requirements. These provisions have now been deleted from the Bill.

67 §201(i) of the US BDA.

68 Clause 2(g) of the Bill defines 'public funded intellectual property' to mean 'intellectual property which is the outcome of research and development for which the government has provided grant under Section 3.'

69 Email correspondence from Prof Karen Hersey (Professor of Law, Franklin Pierce Law Center and Director, ITTI), 19 January 2009.