

## **THE RULE OF ACADEMIC COMMERCIALIZATION: THE BAYH DOLE ACT IN IRAN AND USA**

**Saber Khosravi\*, Mahnaz Ahmadi, Mahtab Barazandeh**

Faculty of Entrepreneurship, University of Tehran, Tehran, Iran

E-mail: [saberkhosravi@gmail.com](mailto:saberkhosravi@gmail.com) (corresponding author)

Received September 2014; accepted December 2014

### **Abstracts**

**Purpose-** Just before the approval of the Bayh dole Act, universities and colleges in the United States of America were used to be associations with the main aim focused on research and education and they could not imagine taking other missions. The approval of this act gave universities the right to submit and take advantage of their research results and academic achievements as intellectual properties which were done by governmental budget. Still over fifty years the Bayh dole Act is considered as the most inspiring act and significant factor in salient development of innovation and its consequent national productivity in the 1990s economy of America. With the encouraging economic and financial outcomes, many other countries like Iran got enthusiastic to authorize and implement the same act. Although Islamic Republic of Iran with developing economy has approved similar academic commercialization rules, they were not successful in practice. Consequently they could not result to similar effects of the Bayh dole Act such as the mutation in development of academic innovation or the commercialization of knowledge base products in universities and, apparently they could not even increase the transfer technology offices (TTO) or the number of university patents and products either.

**Design/methodology/approach-** This article first introduces the background and the contexts of the Bayh dole passage in America and then explains the Act's main outcomes in America's innovation and academic commercialization system. Also it takes a brief look at the similar rules and regulations in other countries including Singapore, China and India.

**Findings-** Moreover, this article contains the comparative study of these regulations and related acts in other countries, especially in America, and their similarities and differences. Finally, by interviewing the Iranian inventors and experts, the defect of internal acts, factors and reasons of their disappointed implementation are illustrated.

### **Research paper**

**Keywords:** Bayh dole Act, University, Commercialization, Intellectual Property, Entrepreneurship

**Reference** to this paper should be made as follows: Khosravi, S., Ahmadi, M., Barazandeh, M. (2014). "The rule of academic commercialization: The Bayh Dole Act in Iran and USA", *Journal of Entrepreneurship, Business and Economics*, Vol. 2, No. 2, pp. 10–25.

## **Introduction**

*Using the thoughts and ideas of inventors is the motive engine in the extent of developing science and technology. In this extent, universities and research institutes, in this process, play a vital role as the scientific-research core of a country. In other words, for obtaining the research goal and sustainable continuous development, creating the legal infrastructure is vital. Generally, the research output protection in countries and research institutes causes the increase of trust level of these outputs. Development due to knowledge based economy severely requires legal backing in the extent of intellectual property such as copyright, inventor's rights, brands, trademarks, and related rights (Alikhan, 2000, Idris, 2003, Cowan and Harrison, 2001) and observing such rights, will considerably help to increase the economic growth (Park and Ginarte, 1997, Blakeney and Mengistie, 2011, Gould and Gruben, 1996, Kim et al., 2012). The main challenge of this approach is on the property of these works and inventions. Academic inventors think that the commercial products of their innovation are their own property. On the other hand, research institutes, particularly universities, know the products as their own property, because they have spent the financial costs and funding and they have also created the appropriate infrastructures. So, in recent decades, the insurance of how to transfer the value of knowledge, produced in universities, has been one of the main concerns of policymakers (Nezu, 2007) The policymakers have found that America, as a leading country in the extent of R&D and technology's innovations, have recognized the potential gains of these institutes. The obvious sample of this can be seen in the Bayh dole Act approved on October 12, 1980, and according to this, America's government allowed universities and*

*research centers of America, which use the federal fund, to benefit and manage their own innovations. Bertha (1995) states that the Bayh Dole Act has become the founder of technology transfer from university to market and in this way, the interaction between university and industry and also the intellectual property management in universities has been augmented. The growth of Technology Transfer Offices in universities after this act (Henderson et al., 1998) caused that this Act becomes known the most significant factor of unprecedented development of innovation and its consequent national productivity in America's economy in 1990s. After the America's impressive success in academic innovations due to Bayh Dole Act, other countries approved and executed similar rules and regulation. In September 2009, planning and policy technology office in Iran also imparted similar regulations as the Guide of Commercialization of research achievements in universities and research and technology institutes, But the defects and gaps of this regulation caused the absence of any impressive change in academic innovations after its notification. So in the present review, in addition to the study of history and conditions of the Bayh Dole Act approval and also presenting a short review of the similar acts ratification in other countries, by using the comparative research method, the reasons of lack of appropriate implementation of similar rules and regulations in Iran are studied.*

### **Research Method**

*For obtaining the research goals, in this review the comparative law research method has been used. Comparative method is one of the ways of the subjective data emersion and human society progress in future. This method can make question continuously for future and create new subjective data*

*(Lijphart, 1975). Comparative method, which is based on understanding the similarities and differences, is one of the oldest methods in social thoughts and humanities (Gutteridge, 1946). This method is rooted in Marx and Weber studies (McNeill, 1990) and later it has been developed in many sciences particularly in law. In other words, comparative study method is an analytical method which the scholar concentrates on studying the similar subjects for recognizing similarities and differences of a phenomenon (Paisey and Paisey, 2010). In this review the Bayh dole Act of America is studied comparatively with the academic commercialization rules in Iran.*

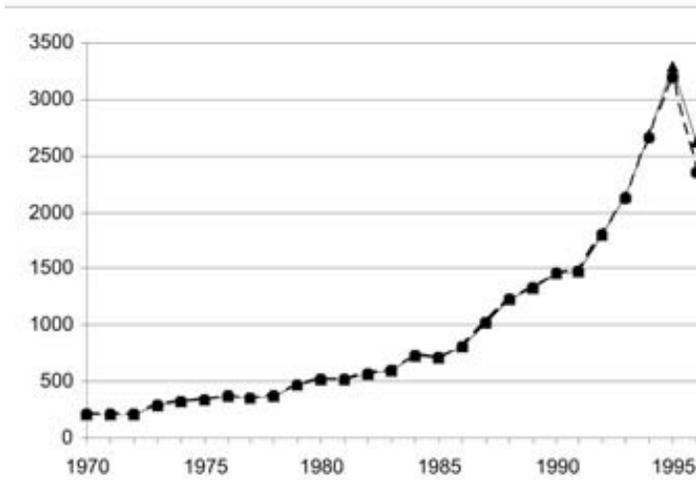
### ***Bayh dole Act***

#### ***Bayh dole introduction and its effect on America***

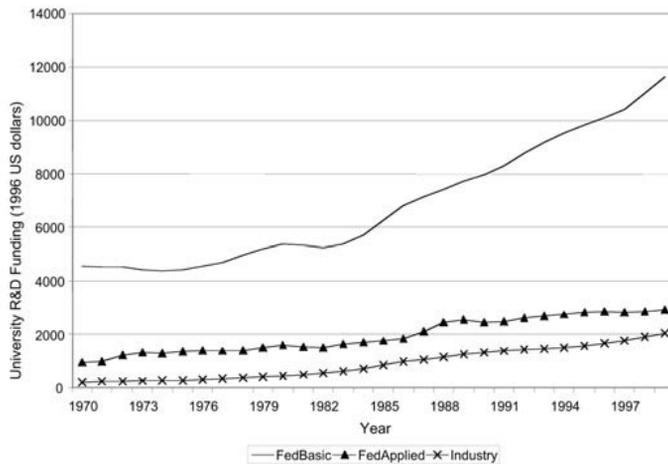
*Before the ratification of Bayh dole Act, universities were just the associations with the mission of academic research and education, and any other function for universities was impossible to consider. But the approval of this act, which was named in Economist magazine as the most inspiring act in the past 50 years of USA (Economist, 2002), enabled universities to use their research productions which were done by governmental budget and it caused more protection of researches and scholars (Toma, 2011). After the approval of Bayh dole Act, new roles for universities, such as third mission (Etzkowitz and Leydesdorff, 1998) or tripartite mission (Etzkowitz and Wolff, 2000), were increasingly identified in literature. Thus, this Act made universities, which formerly were the bridge between wealth and work force, active in market area (Slaughter and Leslie, 1997) and encouraged them to convert their researches into commodities and services which increase public benefits The Bayh-Dole Act and scientist entrepreneurship (Aldridge and Audretsch, 2011). So, academic system changed its goal from*

*education to research and the entrepreneurial universities were developed (Etzkowitz, 2003). In such circumstances, the purpose of publishing, in addition to stabilizing the academic position for researcher, included national fundraising and convincing investigators for financial protection of future researches (Owen-Smith and Powell, 2001).*

*After the approval of this Act, Technology Transfer Offices (TTO) significantly improved for managing the patent registration and licensing process (Mowery and Shane, 2002). The number of TTO increased from 25 offices, in 1980, to 230 in 2004. Between 1996 and 2007, the disclosure of collegiate inventions doubled (from 67.1% in each institute to 131.1%) and the new patent registration programs increased from 23.2% for each institute to 77.6%. During this period, the income due to licensing, also, more than three times increased (Thursby and Thursby, 2011). Moreover, the income due to licensing for the members of the association technology of American universities augmented from 222 million dollars, in 1991, to 698 million dollars in 1997 (Mowery et al., 2001). As it is shown in figure 1 and 2, the number of patents registration and also the measure of investment at universities had impressively improved.*



**Figure 1.** *The number of Patents registration (Dai et al., 2005)*



**Figure 2.** *The measure of investment at universities (Dai et al., 2005)*

Many commentators and policymakers of America believe that during 1990s and early 20<sup>th</sup> century, Bayh dole Act was the most significant inductor and the greatest operator of unprecedented academic innovation growth. Meanwhile, the Organization for Economic Cooperation and Development (OECD) argues that the Bayh dole Act is the main reason of significant

*growth and increase of incomes, employments and national efficiency in 1990s (Mowery, 2004). For instance, in 2004, more than 3800 inventions was registered in American universities, to the extent that in 1980, just there were 250 inventions extracted from university researches. Until 2004, more than 3100 innovation products, resulting from the researches of universities or non-profit scholarship centers, were presented to market. Also, from the time of the Act approval to 2004, 4543 companies were established based on licensing from universities and non-profit scholarship centers (Peter, 2007). The points and numbers mentioned above, clearly shows the great effect of Bayh dole Act on America's scientific environment and market.*

*30 years after the ratification of this Act, Senator Birch Bayh, in his report (2009) in the Bureau of National Affairs, considered his satisfactory about this approval, and reviewed some of its results such as: a. establishment of more than 6000 American companies based on academic inventions, b. institution of two new companies per a business day, c. presentation of 4350 new products due to licensing the academic inventions. Some of other outcomes of this Act might be: about 5000 effective licenses between university and industry (AUTM) and producing more than 153 medicines, vaccines or experimental devices extracted from the results of researches done by federal budget after the approval of this Act. Moreover, the report of The Biotechnology Industry Organization showed that through the years of 1996 and 2007, academic inventions had an effect of more than 187 billion dollars on Gross Domestic Product (GDP) and 457 billion dollars on Industrial Gross Product in America, and created 279000 jobs in United States (Roessner et al., 2009). According to reports, in 2010, one of ten income factors of American universities, which is dedicated to 57% of their gross*

*income (about 1.79 billion dollars), was obtained from licensing efforts of universities (Lane and Johnstone, 2012). Also based on the surveys and reports of Association of University Technology Managers (AUTM), the gross privilege paid to universities increased remarkably 284% from 1993 to 2002. In other words, it augmented from 238 to 915 million dollars (AUTM, 2002, AUTM, 1993). These stunning and surprising statistics point out the great effect of Bayh dole Act on America's economy.*

### ***The effect of Bayh dole Act on other countries***

*The amazing effects of this Act on America encouraged other countries to ratify similar rules and regulations in their own development and progress programs. In 1999, Japan ratified its local version of Bayh dole Act (Kneller, 2007, Goldstein et al., 2009). Moreover, in 2000, the draft of Bayh dole Act in China was approved for developing new national technology and reinforcing industry in this country (Luan et al., 2010, Gross, 2013). Taiwan also ratified similar acts (Chang and Yang, 2008). One of the other successful experiences in this extent is Singapore which was known as the capital of piracy publishing (Uphoff, 1991) has become one of the high level countries in observing the intellectual property rights (for example see Business Software Alliance (2007)) or in the extent of inventor's protection and copyright act in 2005 became 7<sup>th</sup> in the world class (Usa, 2010) According to patent law 1994, patent registration in Singapore was expressed and on February 23, 1995 the related act was enforced (Loon, 2009).*

### ***Discussion***

*In Iran also some efforts for regulating the academic commercialization has been done and one of the most important efforts is the guide of commerciali-*

*zation of research achievements in universities and research and technology institutes. This Guide, which has in fact tried to connect trade and universities, includes rules and regulations that have been approved until 2009 in Iran.*

*One of the new installations raised in this guide was Technology Transfer Offices which tried to fill the gaps between university and industry. However it seems that the establishment of TTOs has not been taken serious, and universities, institutes and research associations don't have to establish TTO, while for facilitating the academic commercialization, the establishment of TTOs is necessary. In fact, the guide has not recognized any association liable for establishing TTOs. This may cause to know this guide as an act without any sanction, because most of the Iranian universities do not follow any other goals except education and one of the few universities which has established Technology Transfer Office is Isfahan University of Technology which has taken a step to promote the level of university participation in technology production and publication, and also encourage the academic researchers to disclose the research achievements for commercial exploitation.*

*Another installation expressed in this Guide is Creativity Promotion Center which is defined in the related regulation and its tasks are expressed. In this regulation, the details of the intellectual property protection of the idea owners are not mentioned. It is just said that the achievements of the idea owners are their own property, unless before starting the activity, a written agreement is signed. The ambiguity of this subject, lack of requirement for any agreement or contract in this respect, and also the loss of the innovators idea's registration may increase the probability of ideas abuse.*

*One of the other innovations of this act is Intellectual Property Committee which is defined in article 4 of policy and rules of intellectual property in scientific and scholars institutes and its tasks and obligations are stated. But it must consider that however this Committee, like other installations raised in this regulation, helps the researcher in the extent of patent registration and his intellectual property protection, but in fact it does not shorten the process of research and patent registration.*

*Compared with the Bayh dole Act, it is useful to consider that in Iran, there has not been a great change in the patent registration process yet and Iranian commercialization rules and regulations just aimed to create some installations for promoting creativity, training ideas and also increasing the number of inventions, but the issue of intellectual property is not well consolidated and protected. In Iran patent registration is still in the authority of the related organization and universities are not authorized for patent registration and licensing. But if the authority and the right of patent registration and licensing, like the Bayh dole Act, is given to Iranian universities, the gaps between researches and industry in Iran will be shortened and cause quick entrance of the research and education results in the extent of trade and industry.*

*Moreover, granting the authority of patent registration to universities will strengthen the researchers' and scholars' motivations for invention and research disclosure. It will also give researchers the confidence that necessary and sufficient protection is considered by the government and also the distance between education, research, trade and business will be shortened. However the new installations mentioned in recent regulations, such as TTO and Creativity Promotion Center can be the effective steps to academic*

*commercialization, but it is good to consider that there is still a great gap between academic researches and commercialization which can't be filled with creating such installations. It is while by granting the authority of patent registration to universities, like the Bayh dole Act, a new role will be defined for universities and a great step will be taken to academic commercialization. In other words, Technology Transfer Offices can manage the patent registration process at universities and instead of being an inductor between universities and organizations of registration; they can facilitate the registration process at universities, bring the achievements directly in the world of trade and industry and also attract the financial benefits to the academic society.*

*Another significant point to consider is that the approved rules and regulation in Iran does not have the executive power as much as the Bayh dole Act and universities have liberties in enforcing the regulations. However, the commercial benefit can create the sufficient motivation for universities, but for first steps, it is better that the government forces the academic society to protect the intellectual property of researches.*

*Also in the Bayh dole Act, the intellectual property has a great level of importance than according to the act "Federal agencies are authorized to withhold from disclosure to the public information disclosing any invention in which the Federal Government owns or may own a right, title or interest (including a nonexclusive license) for a reasonable time in order for a patent to be filed. (Chapter 18, 205. Confidentiality) In the Bayh dole Act, for any part in which the Federal Government owns or may own a right, the intellectual property is recognized and it shows the importance of intellectual property and its protection. In the following this Act mentions that*

*“Federal agencies shall not be required to release copies of any document which is part of an application for patent filed with the United States Patent and Trademark Office or with any foreign patent office.” (Chapter 18, 205, Confidentiality) This part clearly shows the appropriate intellectual property protection even in the stage of application for patent registration. It was better that in Iranian regulations, protection of intellectual property would be recognized for each part of the works and inventions and ambiguity or synopsis would have been avoided. In this way, the probability of abusing the works and inventions would be limited and researchers and scholars would cooperate with the organizations relating to commercialization more confidently.*

### **Conclusions**

*To achieve the knowledge- based economy, universities, in addition to their educating and research mission, must become the centers for creating innovation and developing technology. The main challenge in this approach is protecting from intellectual property of reviews and inventions which are done by the protection and the budget of universities and research institutes. In America, the approval of the Bayh dole Act caused the addition of another role to universities and research institutes and also taking a sufficient step to the academic commercialization. After the ratification of this Act, increasing the number of Technology Transfer Offices facilitated the process of licensing and patent registration. Moreover, researchers and inventors were more motivated to disclose their achievements and inventions. Afterwards, the measure of investments at universities and the incomes due to academic researching were augmented impressively. The effects of this Act was too much surprising, so nowadays it is known as one of the most*

*important rules in the extent of America's business environment. Accordingly, similar rules and regulations were approved and executed in other countries. Also in Iran, in 2009, the guide of commercialization of research achievements in universities and research and technology institutes was presented. This guide included all rules and regulations that have been approved until 2009 in Iran. In comparison to Bayh Dole Act, just a short period of time has passed from the time of approving the Iran's regulation, but it is good to consider that in these years, just a few universities were aimed to establish the new installations which were mentioned in the regulation, such as Technology Transfer Offices, Creativity Promotion Centers and Intellectual Property Committees. Also, in Iran's regulation of 2009, the second role has not been defined for universities and the authority of licensing and patenting is in the extent of the authorities of the related organization rather than universities. According to all these issues and defects, the mentioned regulation of Iran did not have the similar efficiency of the Bayh Dole Act and it could not make any great change in the process of Iran's academic commercialization.*

## References

1. ALDRIDGE, T. T. & AUDRETSCH, D. 2011. *The Bayh-Dole act and scientist entrepreneurship. Research policy*, 40, 1058-1067.
2. ALIKHAN, S. 2000. *Socio-Economic Benefits of Intellectual Property Protection in Developing Countries*, WIPO.
3. AUTM, U. *Licensing Activity Survey FY 2006*.
4. AUTM, U. 1993. *Licensing Survey Report*. Chicago.
5. AUTM, U. 2002. *Licensing Survey Report*. Chicago.
6. BAYH, B. 2009. Allen, JP and Bremer, HW, *Universities, Inventors, and the Bayh-Dole Act. Life Sciences Law & Industry Report*, 24, 3.
7. BERTHA, S. L. 1995. *Intellectual property activities in US research universities. Idea*, 36, 513.
8. BLAKENEY, M. & MENGISTIE, G. 2011. *Intellectual Property and Economic Development in Sub- Saharan Africa. The Journal of World Intellectual Property*, 14, 238-264.
9. BUSINESS SOFTWARE ALLIANCE 2007. *Fifth Annual BSA and IDC Global Software: Piracy Study*. Washington: Business Software Alliance.
10. CHANG, Y. C. & YANG, P. Y. 2008. *The impacts of academic patenting and licensing on knowledge production and diffusion: a test of the anti- commons effect in Taiwan. R&d Management*, 38, 321-334.
11. COWAN, R. & HARISON, E. 2001. *Intellectual property rights in a knowledge-based economy, MERIT, Maastricht Economic Research Institute on Innovation and Technology*.
12. DAI, Y., POPP, D. & BRETSCHNEIDER, S. 2005. *Institutions and intellectual property: The influence of institutional forces on university patenting. Journal of Policy Analysis and Management*, 24, 579-598.
13. ECONOMIST, T. 2002. *Innovation's golden goose. The Economist*, 12.
14. ETZKOWITZ, H. 2003. *Research groups as 'quasi-firms': the invention of the entrepreneurial university. Research policy*, 32, 109-121.
15. ETZKOWITZ, H. & LEYDESDORFF, L. 1998. *The Endless Transition: A'Triple Helix'of University Industry Government Relations. Minerva*, 36, 203-208.
16. ETZKOWITZ, H. & WOLFF, M. 2000. *Tech transfer, incubators probed at Triple Helix III. Research Technology Management*, 43, 4-5.

17. GOLDSTEIN, P., GANEA, P., GARDE, T. V., STRAUS, J. & WOOLLEY, A. I. 2009. *Intellectual Property in Asia: Law, Economics, History and Politics*, Springer.
18. GOULD, D. M. & GRUBEN, W. C. 1996. *The role of intellectual property rights in economic growth*. *Journal of development economics*, 48, 323-350.
19. GROSS, C. M. 2013. *The growth of China's technology transfer industry over the next decade: implications for global markets*. *The Journal of Technology Transfer*, 38, 716-747.
20. GUTTERIDGE, H. C. 1946. *Comparative law: an introduction to the comparative method of legal study & research*, CUP Archive.
21. HENDERSON, R., JAFFE, A. B. & TRAJTENBERG, M. 1998. *Universities as a source of commercial technology: a detailed analysis of university patenting, 1965–1988*. *Review of Economics and Statistics*, 80, 119-127.
22. IDRIS, K. 2003. *Intellectual property: a power tool for economic growth*, WIPO.
23. KIM, Y. K., LEE, K., PARK, W. G. & CHOO, K. 2012. *Appropriate intellectual property protection and economic growth in countries at different levels of development*. *Research policy*, 41, 358-375.
24. KNELLER, R. 2007. *The beginning of university entrepreneurship in Japan: TLOs and bioventures lead the way*. *The Journal of Technology Transfer*, 32, 435-456.
25. LANE, J. E. & JOHNSTONE, D. B. 2012. *Universities and colleges as economic drivers: Measuring higher education's role in economic development*, SUNY Press.
26. LIJPHART, A. 1975. II. *The comparable-cases strategy in comparative research*. *Comparative political studies*, 8, 158-177.
27. LOON 2009. Singapore. In: GOLDSTEIN, P. & JOSEPH, S. (eds.) *Intellectual Property in Asia* Berlin: Springer Berlin Heidelberg.
28. LUAN, C., ZHOU, C. & LIU, A. 2010. *Patent strategy in Chinese universities: a comparative perspective*. *Scientometrics*, 84, 53-63.
29. MCNEILL, P. 1990. *Research Methods*. London: Richard Clay Ltd.
30. MOWERY, D. C. 2004. *Ivory tower and industrial innovation: university-industry technology transfer before and after the Bayh-Dole act in the United States*, Stanford University Press.
31. MOWERY, D. C., NELSON, R. R., SAMPAT, B. N. & ZIEDONIS, A. A. 2001. *The growth of patenting and licensing by US universities: an assessment of the effects of the Bayh–Dole act of 1980*. *Research policy*, 30, 99-119.
32. MOWERY, D. C. & SHANE, S. 2002. *Introduction to the special issue on university entrepreneurship and technology transfer*. *Management Science*, 48, v-ix.

33. NEZU, R. 2007. *Technology Transfer Intellectual Property and Effective University-industry Partnerships*. WIPO.
34. OWEN-SMITH, J. & POWELL, W. W. 2001. *To patent or not: Faculty decisions and institutional success at technology transfer*. *The Journal of Technology Transfer*, 26, 99-114.
35. PAISEY, C. & PAISEY, N. J. 2010. *Comparative research: an opportunity for accounting researchers to learn from other professions*. *Journal of Accounting & Organizational Change*, 6, 180-199.
36. PARK, W. G. & GINARTE, J. C. 1997. *Intellectual property rights and economic growth*. *Contemporary Economic Policy*, 15, 51-61.
37. PETER, K. Y. 2007. *Intellectual Property and Information Wealth: Patents and trade secrets*, Greenwood Publishing Group.
38. ROESSNER, D., BOND, J., OKUBO, S. & PLANTING, M. 2009. *The economic impact of licensed commercialized inventions originating in university research, 1996–2007*. Report to the Biotechnology Industry Organization, Washington, DC.[Links].
39. SLAUGHTER, S. & LESLIE, L. L. 1997. *Academic capitalism: Politics, policies, and the entrepreneurial university*, ERIC.
40. THURSBY, J. G. & THURSBY, M. C. 2011. *Has the Bayh-Dole act compromised basic research?* *Research Policy*, 40, 1077-1083.
41. TOMA, J. D. 2011. *Managing the entrepreneurial university: legal issues and commercial realities*, Routledge.
42. UPHOFF, E. 1991. *Intellectual property and US relations with Indonesia, Malaysia, Singapore, and Thailand*, Southeast Asia Program, Cornell University.
43. USA, U. I. 2010. *Singapore Research and Development Policy Handbook*, International Business Publications, USA.