Patent Pools in a Multi-Sectoral Innovation System: Philippine Setting*

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Abstract. The Philippines ranks low in innovative activity. We argue that this inevitably results from unaddressed challenges facing the S&T sector such as lack of government support and private sector participation, low investment levels, lack of qualified personnel, and lack of technology transfer and commercialization. With a view of analyzing the problems vis-à-vis the R&D landscape in the country, the key players, their relationships and interaction mechanisms, and the existing support infrastructures, we embarked on this pioneering Study that involved a formal nationwide survey that includes gauging the awareness and use of patent pools. The survey affirmed the identified significant challenges and led us to conclude, among others, that given the actual level of innovation in the country, massive education campaign on use of patent information must be undertaken before patent pools can mainstream in the innovation system in the Philippines. In this paper, we limited our options for promoting innovative activity through a discussion of various models for a multi-sectoral innovation system. We finally posit that

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unprotected invention may well be exploited in research or commercially without fear of patent infringement, a flexibility proffered by the patent system that may be needed to boost competitiveness in the country.

Introduction

A country's growth and development depends to a great extent on its capacity to innovate, that is, the ability to create and to utilize new and existing knowledge in novel and useful ways. Innovation is among the key indicators of a country's competitiveness.[4] Considered to be a factor-driven[5] economy in Stage 1 of development, the Philippines ranked 71st in the years 2005 to 2008 until its 16-point plunge in 2009, according to the latest Global Competitiveness Index for 2009-2010.[6]

This low level of innovation is manifested in the fact that the country's manufactured exports are slow to diversify and have low value-added. A study released by the Asian Development Bank reveals that more than 60% of the country's merchandise exports come from just two categories, both of which primarily involve assemblies of semiconductors and electronic equipment with low value-added. In 2005, the ratio of imports to exports of electrical and non-electrical machinery was 90.3% for the Philippines, compared with 66.9% for the Republic of Korea and 83.1% for Malaysia. Likewise, domestic manufacturing is low in technological quality and slow in upgrading.

The level of innovation in a country may be determined through, among others, the local patenting activity. From 2000-2006, the total number of invention patents granted by IP Philippines to both local and foreign inventors was 8,207. Of this number, only 96 or 1.16% were

[4] Competitiveness is defined as the set of institutions, policies, and factors that determine the country's productivity (*Porter M.E.*, Institute for Strategy and Competitiveness, Harvard Business School).

[5] According to the Global Competitiveness Report 2009-2010 published by the World Economic Forum, a factor driven-economy competes on the basis of their factor endowments: primarily unskilled labor and natural resources where maintaining competitiveness lies on well-functioning public and private institutions, a well-developed infrastructure, a stable macroeconomic framework, and a healthy and literate workforce. Countries in Stage 3 of development, most of which are developed ones, are considered to be innovation-driven economies. At this stage, companies must compete through innovation producing new and different products.

[6] One hundred thirty-three (133) countries comprised the WeForum Report.

granted to local inventors. Statistics indicate that the country has been regressing as far as local patents are concerned. From an average of 28.6 patents in a year in the 1990s, the country produces only around ten patents annually.[7] In the case of universities and research & development institutions (RDIs), according to Santiago (2003)[8], records show that universities have started filing patent applications in 2001, and in 2002 patent applications were filed by the university researchers in their names.[9] For the 5-year period covered by the Study from 1998-2003, a total of five (5) patent applications are associated with the universities. During the same period, no patent was granted to any university or RDI.

This situation can be attributed to a myriad of factors some of the more common ones are discussed here.

First, the perennial lack of recognition of the importance of, and support to, S&T as significant component in the innovation process that helps promote the advancement of the level of economy of the country. Where developed countries and those in transition have long recognized and actively contributed to the global shift from the limited tangible economy to the limitless knowledge-based economy, the Philippine economy is largely dependent on basic resources having great assets but with modest development outcomes driven by dollar remittances and consumption rather than by investment or productivity. [10]

Second and corollary to the first, the lack of priority and hence, insufficient government budgetary allocation for R&D that limits the capacity of institutions and universities to conduct research and develop better technologies. A worldwide survey of R&D expenditure shows that the Philippines spent only 0.11% of GDP on R&D, one of the lowest in the world, and ranked 89th of 103 countries. This is way below the 1.0

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[7] Data is from the Philippine Intellectual Property Office.

[8] Santiago, J (2003), "Study on University-Based Research and Development" (Unpublished). The Study covering a 5-year period from July 1, 1998 to June 20, 2003, provides an overview of the status of the Philippines in terms of the ventures in R&Ds by its universities and their utilization and exploitation of intellectual property rights (IPRs), if any.

[9] There is no information whether or not prior to 2001, university researchers were filing patents in their individual names.

[10] See *von* Amsberg, J (2007), "Philippines: Ready for the Future?" July 24, 2010.

percent minimum allocation recommended by the UNESCO. In comparison, neighboring Malaysia spent 0.69% of its GDP on R&D, and Thailand, 0.26%.[11]

Third, there is weak, if not lack of, institutional linkage for innovation among Higher Educational Institutions (HEIs), public RDIs and industry, which results in minimal enterprise investment in the former's innovation activities and inadequate support and mechanism for the commercialization of technologies. There is a perception that research programs of the academe and government agencies do not have relevance to industry and the country's development. Research activities in universities and their eventual transfer of technology to the marketplace rarely occur also because of the traditional mindset of universities that their main purpose is only for research and education and not for commercialization.

Fourth, there is poor IP awareness among institutions, such as research organizations and universities that are likely to be sources of patent applications. In these institutions, knowledge on IP is generally limited to those in the legal field. Scientists and researchers in universities have inadequate understanding of the nuances of the IP system and thus fail to utilize the patent system to their advantage.

Fifth, for the longest time, scientists and researchers attitude are confronted with the publish-or-perish mentality. This means that researchers would rather publish their works in scientific and technical journals rather than develop their work and obtain IP protection through patents. Publication results in instant gratification as compared to undergoing patent prosecution where substantive costs are involved not to mention the uncertainties of obtaining a grant and success of commercialization.

In addressing this problem, this paper limits its focus to the identification of multi-stakeholder systems that provide institutionalized mechanisms for information sharing and research coordination and/or collaboration activities. A possible system to be explored among others is patent pools, an arrangement which eliminates problems caused by

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[11] Asian Development Bank, *Highlights of Philippines: Critical Development Constraints;* http://www.adb.org/documents/books/philippines-critical-dev-constraints/critical-dev-constraints.pdf.

blocking patents through licensing and/or cross-licensing. A patent pool provides incentive for further innovation by enabling its members to share the risks associated with research and development. A patent pool also facilitates an institutionalized exchange of technical information not covered by patents. It provides a mechanism for free sharing of technical information related to patented technology among its contributing members and its licensees and may serve as efficient approach to provide R&D direction, facilitate knowledge sharing and maximize resources of SME, RDI and HEI. The government has to create the necessary infrastructure and provide strong administrative and other support to enable firm rooting of alliances among the willing partners.

The objective of the research project is to make a study[12] of the innovation sector in the Philippines, particularly of the key players, their relationships and interaction mechanisms, and the existing support infrastructures that account for the low level of innovation, with the end in view of proposing models for multi-stakeholder systems, including patent pools, aimed at raising the level of innovation in the country. The research project's methodology involved baseline studies through legal scanning of the applicable and relevant provisions of law and procedures and the study of the applicable programs and activities of the various government offices, private and public universities and RDIs. To obtain primary and direct information from where findings are formed and conclusions are made, a formal nationwide survey of select SME, RDI and HEI was conducted, preceded by seminar workshops that were used as vehicle for educating prospective respondents on the central concern of the project, i.e. patent pools.

Information and data from secondary sources such as from existing studies, narrated documents, other records, and from the websites of the relevant agencies were employed to supply qualitative and some of the quantitative data that have not been drawn from the survey data collected.

Sampling and Coverage

[12] *Santiago, J., Vilchez, G. & Mendoza, A. (2009),* "Exploring Patent Pooling As A Tool For National Development", Arellano Law Foundation. The Study is the result of a research grant from the International Development Research Centre of Canada and was completed in October 2009.

The sampling frame of the respondents classified as SME, RDI and HEI from both government and private sectors consisted of the network institutions of the Department of Science and Technology (DOST) councils and regional offices, which are the best sources of sample institutions that meet the requirements of the study's objectives.

The plan of having separate samples and treating the regions and various R&D sectors separately had to be scrapped due to the overlaps in the network institutions of the councils and the regional offices. To address this situation, purposive sampling was resorted to. Thus, the final list of 294 uniquely identified institutions comprised the sample broken down as: Government Office/Organization – 36 (12.2%); Government Academe – 108 (36.7%); Private Corporation – 91 (31.0%); and Private Academe – 59 (20.1%).

The survey results and analysis appear as Annex A to this paper.

Models for Multi-Stakeholder Systems

Innovations in the Philippines are generated by and may be found in both the public and private sectors. To spur and facilitate innovation, there is a need to create multi-stakeholder systems that provide institutionalized mechanisms for information sharing and research coordination and/or collaboration activities. The government has to create the necessary infrastructure and provide strong administrative and other support to enable firm rooting of alliances among the willing partners. Beyond focusing on industry clusters, however, innovation promotion should encompass policy harmonization and prioritization and include the provision of governance stability and consistency in the delivery of support services and facilities required for innovation.

It is not enough, however, to encourage innovation activity in the country. Innovation must be responsive and contributory to national development goals and must be directed at resolving pressing national problems. Any innovation strategy to be pursued must be within the context of the national development plan. R&D strategy and activity must be coordinated, focused and directed towards the achievement of the clearly identified national development goals outlined in the MTPDP 2004-2010 and NSTP 2002-2020.

To achieve the aforementioned goals and to resolve the problems confronting the S&T sector in its efforts to spur innovation and promote national development, existing R&D infrastructures, such as industry

clusters, Technology Business Incubators (TBI) and S&T parks must be maximized and replicated, and new ones such as patent pools may be adopted and utilized to complement existing systems.

1. Clusters

Porter (2004) defines clusters as geographically proximate groups of interconnected companies, suppliers, service providers, and associated institutions in a particular field, linked by commonalities and complementarities. Clusters are often concentrated in a particular region within a larger nation, and sometimes in a single town. According to Porter, clusters affect competitiveness in three broad ways. First, they increase the productivity of constituent firms or industries. Firms with a cluster have more efficient access to specialized suppliers, employees, information, and training than isolated firms. The presence of a full range of inputs, machinery, skills, and knowledge promotes greater efficiency and flexibility than vertical integration or relationships with distant suppliers. Second, clusters increase the capacity for innovation and productivity growth. Opportunities for innovation can often be perceived more easily within clusters, and the assets, skills, and capital are more available to pursue them. Third, clusters stimulate and enable new business formation that supports innovation and expands the cluster. The local presence of experienced workers and access to all the needed inputs and specialized services, for example, reduces the barriers to entry. The availability of highly experienced managers, researchers, and technicians in the field; and access to specialized venture capital providers, lawyers, and suppliers all reduce the costs and risks of starting a new life sciences company. The many local options for employment in other cluster companies lower the perceived risk of failure. The challenge for an economy is to move from isolated firms to an array of clusters, and upgrade the sophistication of clusters to more advanced activities.[13]

The importance of clusters has been recognized in the Philippines as an effective tool in fostering productivity and innovation.

[13] *Porter M.E.* (2004) supra; "Location, Clusters, and Company Strategy" Michael E. Porter Oxford Handbook of Economic Geography G. Clark, M. Gertler, and M. Feldman, eds Oxford: Oxford University Press 2000; "Location, Competition and Economic Development: Local Clusters in a Global Economy" Michael E. Porter Economic Development Quarterly 14, no. 1, February 2000: 15-34; "Clusters and the New Economics of Competition" Michael E. Porter Harvard Business Review November-December 1998.

Theoretically, location should no longer be a source of competitive advantage as open global markets, rapid transportation, and high-speed communications should allow any company to source anything from any place at any time. In practice, however, location remains central to competition. This is especially true in the Philippines, an archipelago of about 7,000 islands, where challenges in the distribution infrastructure is a reality. Weak distribution infrastructure adversely affects the flow of information and supply required for innovation and entails additional cost burden in terms of higher transportation and communication costs. In the Philippines, thus, it is necessary to locate innovation activity in geographical clusters to facilitate access to specialized suppliers, employees, and information.

Thus, the national government, through its various agencies has consistently promoted its development programs through regional clusters. For example, the organizational structure of agricultural R&D in the Philippines involves two separate but closely-linked networks existing side by side: the National Agriculture and Resources Research and Development Network (NARRDN) and the regional consortia. Both systems comprise a large number of national government, regional government, and higher education agencies, each with its own commodity focus and area of responsibilities.[14] Likewise, the DOST councils work through regional consortia and zonal centers to implement its policies and programs.

Industry clustering is also a recognized strategy for the development of local government units. An example is in the case of the Caraga Region which composed of four provinces: Agusan del Norte, Agusan del Sur, Surigao del Norte and Surigao del Sur. In 2004, The Regional Development Council of Caraga Region, approved the use of industry clustering as an economic strategy for development. Seven industries were identified by the core group of public sector officials: Agribusiness industries- Banana, High value crops, Abaca, Oil Palm; Aquamarine- seaweeds, Services-Tourism and manufacturing-arts and crafts.

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[14] *Stads G., Faylon P, Buendia L.* (May 2007), "Agricultural R&D in the Philippines: Policy, Investments and Institutional Profile," (ASTI Country Report).

Clustering is a dynamic process that must be responsive to changes in the overall business environment, which include the supply of materials, packaging and brand development, and competition for competent staff, among others. The cluster must also to respond to macro issues such as peace and order, foreign exchange issues, and energy cost increases .To strengthen clusters, former DOST Secretary Follosco gave the following proposals:(1) upgrade education and manpower sector;(2) intensify product development and R&D efforts;(3) provide necessary boost to the production sub-cluster;(4) strengthen marketing facilities for both domestic and global markets;(5) address issues of availability and affordability of financing; and(6) provide adequate support to fill capability gaps like common service facilities, business incubators and other general support.[15]

2. Technology Business Incubators and S&T Parks

Technology business incubators are programs designed to accelerate the development of innovative ideas and start-up businesses, by providing business support services and access to resources. These support services include professional assistance from business basics training to accounting/financial management, regulatory compliance and intellectual property management; linkages such as networking activities, links to strategic partners and links to higher education resources; access to funding such as access to bank loans, loan funds and guarantee programs as well as access to angel investor or venture capital; technology commercialization and marketing assistance; and facilities such as high-speed internet access.

S&T parks are master planned property and buildings designed primarily for private and/or public R&D facilities, high S&T based companies, and support services, dedicated to product development and innovation. S&T parks provide a venue where government, universities and private companies cooperate and collaborate, thereby creating environments that foster collaboration and innovation. Often, S&T parks are associated with or operated by institutions of higher education. The park may be a non-profit or for-profit entity.

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[15] *Follosco CL*, "Industry Clustering: Inspiring Ways to Competitiveness," Export Development Council; http://synthesistblog.com/industry-clusters-inspiring-efforts-to-grow-tfp-in-the-philippines-post-14/.

S&T parks provide a range of business assistance to its client companies, which are often small start-ups based on innovative new ideas from university or private sector researchers. Trainings in areas such as intellectual property law and business planning help the startup businesses to succeed. Universities, in turn, benefit by exposure to the business world, and the linkage to the advanced researches being conducted in the industry. S&T parks facilitate the transfer of technology and business skills between university and industry. S&T parks also enhance the development, transfer, and commercialization of technology, thereby promoting technology-based economic development for the community.

In the Philippines, several TBI and S&T parks have been initiated and established by the private sector such as the UP-Ayala Technopark at Diliman, Quezon City, the AIM-Ayala Technology Business Incubator in Makati City, the UPVCC-Ayala TBI in Cebu City, and the Silicon Gulf in Davao City cited earlier.

Likewise, the national government, through the DOST has established TBIs such the one launched on October 1, 2007 at the ICOT Park, Leyte Academic Center. The TBI was designed as a facility to assist ICT-based businesses to start, operate, and expand. The aim of the TBI is to help create a strong ICT-industry for Region 8 and make the Province of Leyte as the next ICT hub in the country. The TBI also aims to provide value-added jobs and services, foster entrepreneurial spirit and facilitate technology transfer.

Again this 2009, the DOST, in partnership with the PEZA launched the DOST-PEZA Open Technology Business Incubator (DOST-PEZA Open TBI) at the Open TBI Building, ASTI Compound, UP Science and Technology Park in Diliman, Quezon City. With the aim to foster innovation, economic development and global competitiveness, the DOST-PEZA Open TBI will cater to the needs of start-up companies dealing in software, content, and hardware development, especially those incorporating open technologies. It offers in-house and virtual incubatees a range of services such as business coaching, marketing consultation and IP assistance.

TBIs and S&T parks are venues for collaboration and information exchange among innovation stakeholders such as university, industry and government. These projects then must be replicated in strategic areas all over the country to foster innovation not only in the ICT field but also in other sectors identified under the MTPDP 2004-2010 and NSTP 2020 as

priority areas for development. Activities of TBI and S&T parks can complement and/or be integrated with industry cluster activities in the community.

3. Cooperative R&D

Cooperative R&D are collaborative arrangements whereby parties agree to share resources as well as the risks of innovation with the goal of generating new goods, processes, and services for the marketplace. Cooperative involves different institutional and legal arrangements, such as research contracts, joint ventures and research consortia, where the academe, industry, and government can play complementary roles. Cooperative R&D arrangements are designed to utilize and integrate the strengths of the participants. They allow for shared costs, shared risks, shared facilities, and shared expertise. Cooperative R&D are flexible arrangements can allow for the development of institutional and organizational plans tailored to the specific needs of the particular project. Collaborative R&D can be "horizontal," where companies work together to perform research and then use the results within their individual organizations, or "vertical," where researchers, producers, and users work together.

Cooperative R&D may be in the form of: (i) industry-industry joint projects, which may or may not involve the creation of a new entity to undertake research; (ii) industry-university collaboration whereby industry supports research centers at universities, contracts individual research projects, and/or exchanges personnel; (iii) cooperative activities with the government whereby the private sector is allowed access to government facilities and researchers, or funding for industry-industry or industry-university efforts is provided, or financial support is given to centers of excellence at universities to which the private sector has access.

As discussed in the previous chapters, industry-university collaboration and cooperative activities by academe and industry with the government are practiced in the Philippines in various ways and degrees. However, industry-industry collaboration is hampered by the entrepreneur's fear of losing control over the enterprise and due to mistrust arising from the prevalent copycat strategy employed by companies in the development of their processes, products and services. To encourage industry-industry collaboration, there is a need to educate the private sector on the benefits of cooperative R&D as well as the various strategies to manage the flow of knowledge spillovers to and from

competitors, through investments in knowledge protection. This involves intensifying IPR promotion and education so that the IP system will be adopted and practiced by the industry. The government can also encourage industry-industry R&D by, among others, providing the basic governance stability required by industry, access to funding and to low–cost facilities, and by granting fiscal incentives such as tax holidays.

Industry-university cooperative R&D must be intensified by strengthening linkages between the academe and industry. This is because universities perform much of the basic research fundamental to certain technological advancements. Universities can also provide education and training to industry scientists, engineers, and managers. Universities, however, do not have the commercialization capacity available in industry. If researches and technologies in the academe are to be converted or integrated into goods and services, linkages between the university and industry must be established and fostered. In the Philippines, however, studies show that universities are generally not seen by industry as likely sources of innovative ideas. It is possible, however, that the necessary research or technologies required by industry already exist in the university, but because of lack of interaction, such research or technologies are not brought to the attention of industry. Encouraging cooperative industry-university R&D will benefit industry which does not have to take the risks of research already being done in the university. Industry can direct its focus on more advanced technology research and direct available resources to other projects required for business development. On the other hand, strengthened industry-university linkage will benefit the academe as industry can provide the necessary funding for basic research in universities.

To foster cooperative R&D, the government must make more accessible its facilities, resources, knowledge and expertise. Government laboratories have the equipment as well as experienced and skilled scientists and engineers that are needed for R&D, especially by start-up companies with limited resources. To ensure the availability of S&T manpower, the government must be serious in its efforts to implement the Magna Carta for scientist, engineers, researchers and related science and technology personnel in government (Republic Act 8439) by providing sufficient funding for its implementation.

Collaboration between government personnel and industry is beneficial to government. Interaction with industry offers government scientists and engineers valuable information that can be used for

government R&D, especially in areas where industry is more technologically advanced such as electronics and computer software important to national defense.

To increase industry competitiveness and achieve national development goals, the government must, more than just encouraging cooperative research, also exert efforts to facilitate the commercialization of technologies resulting from the research. This can be done, for example, by granting additional government incentives for commercialization, as launching a new product also entails major costs during the development and marketing stages. Basic distribution infrastructures must also be provided to decrease the cost of transportation and delivery of goods to end-users.

4. Patent Pool

Patent pools are agreements between two or more patent owners to license one or more of their patents as a package to one another, and to third parties willing to pay the associated royalties. Agreements with third parties can be accomplished directly, between patentees and licensees, or indirectly through the establishment of a body specifically set up to administer the pool. A patent pool is a useful tool in the clearing of patent thickets and has the following significant benefits among others:

i) Eliminates license stacking

License stacking occurs when there is an excessive accumulation of patent claims for the production of a single product whereby a manufacturer who wishes to manufacture the same has to execute a license agreement with and pay royalties to each and every patent owner to manufacture said product. Patent stacking discourages innovation as the accumulated cost of separate license fees may be so prohibitive that the development and eventual commercialization of the product becomes unviable. Through the patent pool, the patent holders agree to jointly license their complementary patents under such terms that are considered as fair, reasonable and to divide the proceeds according to an agreed proportion.

(ii) Lowers transaction costs through introduction of a system of "one-stop" licensing

The cost of negotiating one non-exclusive license for a basket of rights, which is offered by a patent pool to all comers at the same (reasonable) price on the same terms is much simpler and cost-effective

than the alternative of having each player engage in separate negotiations with different patentees in order to collect the same basket of rights individually. In addition, obtaining a basket of rights through a well-formed patent pool removes the costs and manages the risk normally associated with freedom-to-operate studies, the uncertainty of patent litigation and the time and effort required to negotiate with multiple licensors.

Patent pools also mitigates the risk of patent "hold-up," a situation which occurs when a patent holder uses a court's issuance of an injunction (or merely the threat of an injunction) to block an infringer's use of the patented invention unless the infringer, who has made sunk investments in expectation of using the patented invention, pays a royalty that is, from the infringer's perspective, excessively high.

If licenses can be obtained affordably and easily, then a licensee-company can spend more of its resources on its core competencies and bring better products or services into the market in a faster and cheaper manner. R&D funds are spent on technical innovations and not transactions costs.

(iii) Clears blocking patent positions and avoids costly infringement litigation.

(iv) Leads to the exchange of technical information that is not covered by patents, through a mechanism of sharing technical information relating to the patented technology that would otherwise be kept a trade secret.

(v) Forestalls government policy: it is better to encourage companies to establish patent pools than force them to compulsory licensing scheme.

It is clear from the survey results that patent pools are rarely, if not, practiced in the country. Universities and academic institutions in the Philippines do not possess sufficient patents, much less complementary ones, sufficient to encourage patent pools. From the formal survey of this Study, only two (2) universities with R&D activities have responded affirmatively to questions pertaining to patent pool policies, such as those that deal with issues of ownership over intellectual property rights and allocation of revenues derived from the exploitation of intellectual property.

Conclusions and Recommendations

Admittedly, the Philippines has a lot of catching up to do to make it competitive in terms of innovation.

The DOST has outlined various strategies including: (i) S&T human resource development which aims to build future S&T capabilities through focused programs in basic and higher education, align vocational, technical and skills and development programs to the requirements of global competitiveness of Philippine industries, and promote partnerships with the private sector; (ii) provision of support to industries particularly SME by, among others, harnessing the capabilities of the academe in meeting the technology requirements of industries, particularly in their weak areas; (iii) accelerating technology transfer and utilization through the promotion of networking among various stakeholders and the mobilization of the financial sector in support of technology transfer and commercialization; and (iv) strengthening of government-industry-academe-civil society and international linkages.

While our Study joins the community of existing studies and literature outlining recommendations to spur innovation, we add to the list the following -

Government must as a policy encourage multi-sectoral collaboration by among others recognizing the importance of harnessing S&T results, investing on R&D infrastructures to provide institutionalized mechanisms for information sharing, research coordination and collaboration among the various sectors; and creating strategies for effective management, use and commercialization of intellectual property. Strengthening legal infrastructure is a way of encouraging the increase of the private sector's stake in technology innovation, a key element in the development process of high growth and prosperous Asian economies such as South Korea, Japan, Taiwan, Hong Kong and Malaysia.

There is also a need to devise and implement viable and aggressive strategies for increased IP awareness and adoption among R&D institutions. This should include the establishment of strong linkages with IP experts and professionals. R&D institutions must be made aware and educated about the use of patent information as source of innovative ideas and to avoid research duplication and waste of resources. The increased awareness of IPR and adoption of relevant IP policies will facilitate and promote innovation as gray areas in the identification and ownership of IP,

the patentability of technology subject of R&D, the protection and enforceability of IPR and the sharing of benefits are clarified.

Based on the survey results in the study, R&D in the Philippines is generally responsive to industry needs and can enhance the long-term economic development of the country. The challenge is for the country to have closer linkages among stakeholders, more transparency and more public information campaigns on S&T programs. Closer linkages will bring the technology created in the university to industry where the technology can have practical application. Users of the technology are in turn sources of innovation ideas for technology improvement and development.

While this paper has identified the multi-sectoral support system, the discussion offered a menu of options that can be used for increased R&D cooperation and linkages. Particularly, in terms of the use of patent pools as research strategy for R&D cooperation in the country, the survey confirmed what we knew all along, i.e., that there is none or there is an insignificant use of patent pool in the country. Depending on the seriousness and resources for capability-building activities for researchers on the use of the patent pool route, the possibility for patent pools to mainstream in the innovation system in the country should not be far-fetched after all.

Part of the capability-building strategy is the felt need for a massive education on the use of patent information, an essential tool for the creation, or joining of a patent pool. Its nonuse in the R&D process undermines the benefits of the patent system, which is aimed at stimulating ideas for further invention and innovation through the accumulated pool of technological information that is disclosed and contained in patent documentation.

And lastly, following the principle of territoriality, the patent system provides for protection only on patents that are granted within the country where violation thereof makes one liable for infringement. Over the years, the patent system speaks of protection of intellectual property where many developing countries are unable to take advantage of this due to many factors, a significant number of these, were discussed in this paper. What is not often raised is the flipside of the system i.e., unprotected invention for lack of patent grant in the country may well be exploited in research or commercially. Patents protected elsewhere but not in the country may be exploited without fear of patent infringement. This

flexibility, unknown to most government and university policy makers in developing and least developed countries, and well within the opportunities proffered by the patent system, can be used to their critical advantage that may be needed to boost competitiveness in the country.