Philippine Engineering Journal (1998) XIX (2): 1-12

THE ENGINEERING INNOVATION CENTER: BRIDGING THE INDUSTRY AND THE ACADEME

Leopoldo V. Abis
Professor
Department of Mechanical Engineering
College of Engineering
University of the Philippines
Diliman, Quezon City, Philippines

ABSTRACT

Commercialization of technologies through licensing and patenting has been practiced worldwide. University-based licensing offices that bring university research and development outputs to the industry have become a major source of income for continued support for R&D activities. Industries involved in the transfer of technologies have benefited well with their collaboration.

The Engineering Innovation Center is the unanimous response of the University of the Philippines College of Engineering, the National Engineering Center, the University of the Philippines Alumni Engineers, and the U.P. Engineering Research and Development Foundation, Inc. in promoting commercially the R&D outputs of the U.P. College of Engineering and the National Engineering Center. This paper presents the goals and strategy of Innovation Center as well as its present involvement and future plans.

I. Introduction

Many countries in the Asia-Pacific region, including Singapore, Taiwan and South Korea invest heavily in R&D and technology generation. These countries pour between 1 to 2.5 percent of their Gross National Product (GNP) into R&D compared with only 0.1 to 0.2 percent of the GNP of the Philippines. Figures cited by the Department of Science and Technology (DOST) indicated that less than fifteen (15) percent of the technologies generated and R&D outputs of the different institutes (inside and outside of DOST) in the past (1990-1995) had been adapted by the private sector (mostly cottage and small industries). This effort to transfer technologies to the private sector has hardly impacted on the growth of Philippine industry. There is therefore the need to evolve new strategies that the country can pursue in order to increase the rate of adaptation of relevant technologies and R&D outputs by the industry sector. These include the active participation of the academe.

The Academe has the potential to be one of the major sources of technology innovations in the country today. Generally speaking, research and development outputs from the various universities have not fully addressed the needs of the local industries. In this respect, companies have resorted to importing technologies to suit their needs.

	two entries may entail close working relationship with the University Intellectual Property Office (UIPO) of the University).	
	2.b. Strengthen the Innovation Center's capability /capacity for archiving R&D outputs, project reports, relevant technologies, and significant information which may interest local industry (or possibly preparing a listing of abstracts for public/industry consumption). 2.c. Establish a system (and subsequently strengthen the process) of getting feedback on needs and requirements of industry. This could include electronic mail (or web-based discussion groups), conduct of survey; roundtable discussions; piggyback on academe - industry linkage program, etc. 2.d. Firm up linkage with other (aside from COE/NEC) generators and providers of technologies and know-how.	2.b.1. Develop database for archiving 2.b.2. Industry and government-sponsored conferences/symposia should be attended, whenever possible, to create contracts with the industry and introduce the IC. 2.c.1 Develop web site for the IC. 2.c.2. The MLP should be fully utilized to get insights to the technology requirements of industries. The proper channels should therefore be established in order to achieve this objective. 2.d. Maintain and strengthen current tie-up with institutions through constant communication. Likewise, the IC should create new link-up with other organizations.
3. Review the DOST/DTI priority areas (export winners, basic needs, poverty alleviation, food security, environment, machines and tools to improve productivity).	3.a . Check "updatedness" of these priority areas and secure information on government thrust (continuing or new) in the priority areas in the next few years.	3.a. Coordinate with DOST as regards to the changes, if there are any, to the priority areas.

	3.b. Start determining the measures (technology transfer, innovation, R&D, productivity improvement, etc.) that can be adapted to address these priority concerns. 3.c. Determine the group or institutions (within COE/NEC or outside) that can be provide the answers to these issues.	
4. Aim for a major breakthrough . This will enhance the position of the COE/NEC in innovation. A strategy of focusing on important needs of certain sectors may result in a major breakthrough.	4. With the help of the *Innovation Center's* Steering Committee, projects with high impact on industry and the society may be identified as a potential major breakthrough given enough technical and financial support.	4.a. The /C may do a preliminary study as to what projects and/or a particular engineering discipline may give a high impact on industry with regards to R&D output. 4.b. The /C may recommend to Dean Atanacio that a short conference and/or discussion groups for the faculty be held and formed for this matter to gain their perception.
5. Seek financial support from various sources to fund activities of *Innovation Center.*	5. Establish relationship with institutions that are willing to finance development studies and R&D work. This institution may include: 5.a. MERALCO/MERALCO Foundation; 5.b. Co-sponsoring projects between UPERDFI and industry; 5.c. Technology venture capital of PTDVI; 5.d. TAPI, MIRDC and other government agencies for product/process technology, as well as entrepreneurial development;	5. The /C may start correspondence with the cited institutions and explore and study with them or separately the possible modes of collaboration.

	5.e. Services/funding of patient application and licensing offered by the UIPO and DOST-TAPI; 5.1 Foreign funding agencies which has agreements with government and/or private institutions declaring their intent of providing assistance to selected fields of R&D.	

References

1. ANUTECH Pty. Ltd., Australian National University, 1998, ANUTECH Website URL: http:// www.anutech. com.au/about/about html.
2. Howard, W.G., Guile B.R. et.al. (1992). "Profiting from Innovation: The Report of the Three-Year Study from the National Academy of Engineering," The Free Press, New York, USA, and pp. 13-30, 137.
3. Massachusetts Institute of Technology - Technology Licensing Office (MIT-TLO), Massachusetts Institute of Technology 1997, MIT-TLO Website. URL:http//web.mit.edu/tlo/www/
4. Stanford University Office of Technology Licensing, Stanford University 1998. Standford University OTL Website URL: http://www.stanford.edu/group/OTL/aboutotl.html
5. Uniserch Ltd., University of New South Wales, 1998, Unisearch Ltd. Website URL: http://www.unsw.edu.au/unisearch/
6. VTIP - Intellectual Property Roadmap, Virginia Tech Intellectual Properties, Inc. 1997, VTIP Website URL:http://www.vtip.org/service%20Inventors/iproad/default.htm.

It is in this context that the Engineering Innovation Center was established. The need to institute a formidable link between the academe and the industry had become evident for the University of the Philippines College of Engineering, the National Engineering Center, the University of the Philippines Alumni Engineers, and the U.P. Engineering Research and Development Foundation, Inc. Thus, on August 21, 1997 the Engineering Innovation Center was launched.

II. The Engineering Innovation Center

The Engineering Innovation Center is envisioned to be one of the major players in the country's quest for economic growth, industrial productivity and global competitiveness. This is where the industries and the academe meet and where technology transfer is facilitated. The Center, moreover, shall help address industry problems using innovative and/or alternative approaches developed at the University and other R&D institutions. Lastly, it aims to provide mechanisms for productivity and quality improvement in industry using the facilities and manpower of the academe and other research institutions as elements of a mechanism.

The concept of an innovation center is one wherein an organization is set up which shall serve as an assistance center for the development of R&D outputs, creative works and technologies generated primarily by the faculty and students of the University and secondarily by those from other R&D institutions. As such, the Innovation Center aims to promote commercially technologies developed in the academe. It endeavors to generate interest among potential or would-be investors and technology innovators both form the academe and other R&D institutions to collaborate in further developing these R&D outputs into useful processes and/or products. In addition, the Center shall also provide assistance to industries in product and/or process innovations to improve their quality and productivity. Ultimately, it shall strive to forge collaborative ventures between the University of the Philippines and other R&D institutions in promoting the transfer and utilization of technologies and innovations to industries. Thus, effectively addressing the technological innovation needs of the industry and consequently contributing to the country's capability to compete globally.

The University of the Philippines College of Engineering and the National Engineering Center are among the most active R&D institutions in the country today. It has produced numerous researches and innovations in the various fields of the Engineering profession. The Innovation Center, on the other hand, is continually building up its archive of these R&D outputs. The entries on the archives are, initially, checked to assess their technical soundness and commercial potential value.

Based on this assessment, technologies that have reasonably good chance of commercial success and have passed certain criteria are included in a separate database with its corresponding estimated funding requirements. The Center shall assist in meeting these funding requirements. If the financial requirements are estimated to be large, the Center can help the proponents to prepare proposals for funding, targeting funding agencies and the private sector. In the long term, the Center looks forward to promoting two (2) or three (3) works per year together with its other services.

The process of commercialization of University R&D outputs through the Innovation Center may have various entry points taking into consideration the level of development that it has

undergone. Most of the technologies start when they are entered into the Technology Database. The Project Proponents and Leaders then prepare proposal for funding. As stated above, aside from funds available from the Academe, developmental funds can also channeled from government and private industries and institutions. It is expected, moreover, that industries with particular interest on specific technologies shall be financing its development Figure 1 and 2. shows a schematic diagram of the process of commercialization through the Innovation Center.

Presently, the Innovation Center is housed at the National Engineering Center. It is a two-man operation center managed by the U.P. Engineering Research and Development Foundation, Inc. (UPERDFI). The Innovation Center is proposed to be directly under the National Engineering Center, following the scheme shown in Figure 3. It shall still, however, be managed by the UPERDFI. It is directed by its Steering Committee composed of experts in the various fields of the Engineering profession both from the academe and the industry. Its services include assistance to innovators that shall give access to the UPCOE and NEC's laboratories, workshops and other facilities while the project is in its development stage. As such the Center can also assist in the management and development of the project. The Center shall facilitate the identification of potential investment opportunities by providing assistance in the preparation of feasibility studies, business plans, and marketing plans for the selected technology. As mentioned above, it shall also act as the liaison with the industry and the private sector in the actual promotion of the technology likewise, with the sourcing of development funds. The UPERDFI, through contributions of the private sectors, has established the Technology Development and Strategic Studies Fund in order to provide more funds for technology development. This fund maintains and supports the operations of the Innovation Center.

Industries, on the other hand, can search through the Innovation Center's Technology Database for innovations that would suit their requirements. If however, there would be no matching technology, the Center can make arrangements and refer their needs to the experts in the particular field from the UPCOE and NEC. Figure 2. describes schematically this process.

Intellectual Property Rights (IPR) protection is one of the primary concerns of the Innovation Center. In many technology transfer offices in the United States and Australia, IPR protection is done through technology licensing and patenting. This activity gives these institutions revenues that they use for supporting their own operations and ultimately providing for other projects and researches. These institutions include the Standford University Office Technology Licensing (OTL), the Massachusetts Institute of Technology - Technology Licensing Office (MIT-TLO), both at the U.S., the ANUTECH Pty. Ltd. of the Australian National University, and the Unisearch Ltd. of the University of New South Wales in Sydney, both in Australia. With the signing into law of the Intellectual Property Code of the Philippines in January 1998 and with the subsequent emergence of the university-wide University Intellectual Property office in the Diliman Campus, the Innovation Center is in a proper position to work through IPR requirements of the technology transfer activity.

Referring to Figure 1, the Innovation Center takes into account numerous ways where linkages between the industry and academe may lead technology transfer. As such, IP protection is always considered. IP protection may come as early as the technology's funding proposal is drafted and finally when industry adopts it.

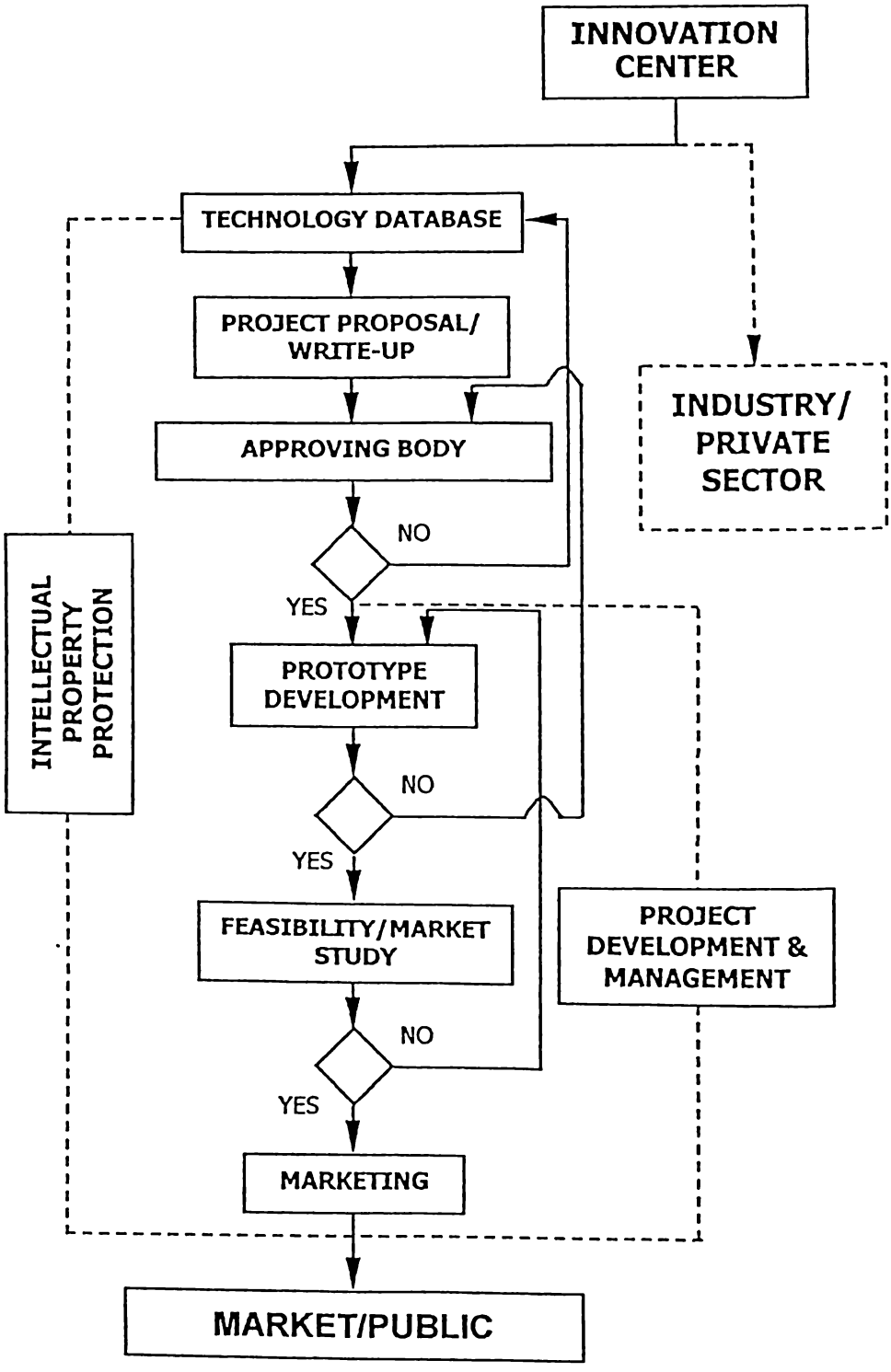

Figure 1. Process flowchart for the commercialization of generated projects

III. Issues on Licensing

Questions on whether or not the COE, through the UPERDFI, undertake commercialization of its developed technologies and R&D outputs, including their licensing for financial gain, have been raised. For instance, should the COE go into some commercial activities which may not be consistent with its mission of instruction, research and extension services? Or, can these planned commercial activities be carried out under extension services of the COE?

Universities abroad, particularly those in the U.S., have extensively discussed this issue over the past twenty-five years. A lot of soul-searching has gone into this issue. Some university people believed that a university should never enter into any commercial venture. According to these people there were several reasons why such commercial ventures should not be pursued. These include the following:

Firstly, conflict of interest might arise. There was the risk that faculty/researchers might give priority to doing R&D which had potential commercial value. The tradition of dissemination of new knowledge through publication R&D results might suffer because of the requirement that usually accompanied the licensing process.

Secondly, licensing entail cost which could become a burden.

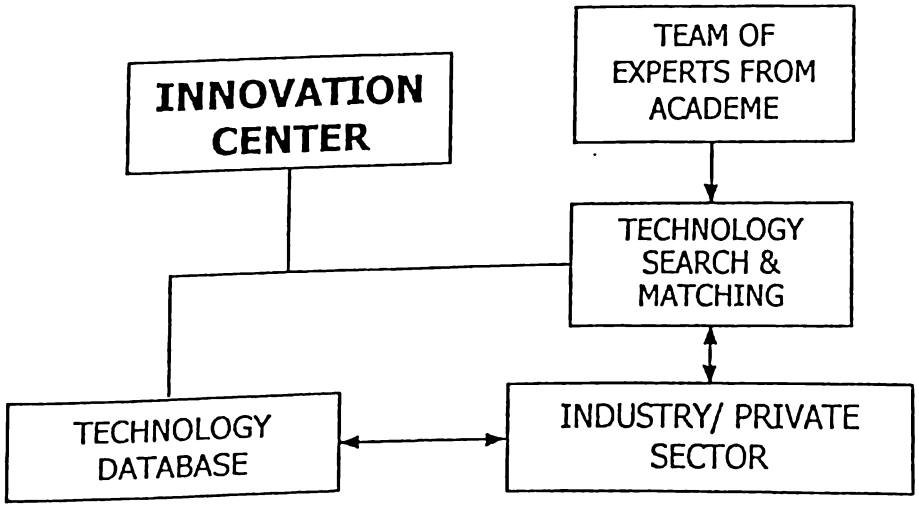

Figure 2. Process flowchart for the industry tapping assistance of the Innovation Center

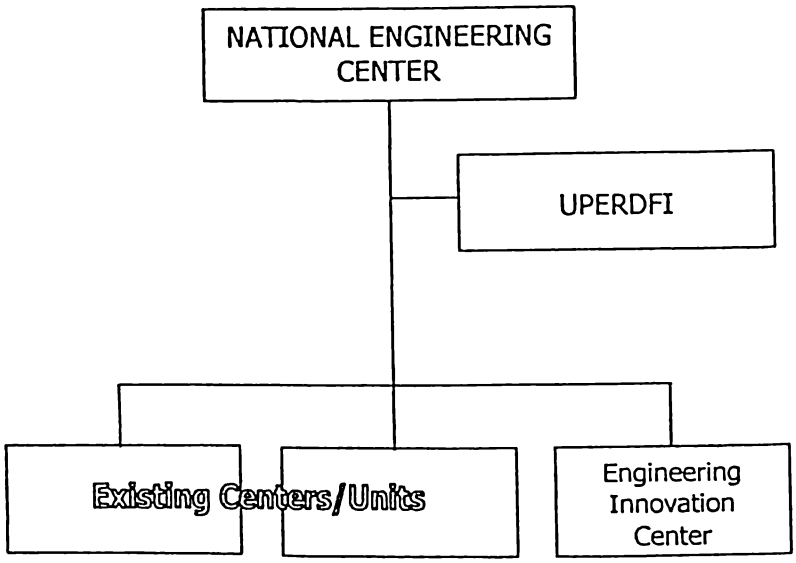

Figure 3. Proposed organizational structure for the Engineering Innovation Center

Thirdly, since some universities were funded through taxes (as in the case of UP COE) then the R&D results and products developed should be made available to the public at no cost basis.

In spite of these oppositions to commercialization of R&D outputs and technologies generated, there were many arguments given by a greater number of people in favor of such commercialization.

The reasons given in favor commercialization of R&D outputs and technologies generated, included the following:

Firstly, income from licensing could be source of additional funds for the university.

Secondly, through licensing, the university could develop new ideas and innovations which could be the answers to becoming globally competitive.

Thirdly, licensing seemed to be the only way R&D results would ever become commercialized.

Fourthly, the prospect of having some financial reward might be an incentive for the faculty/researcher to be more productive.

Fifthly, the university might be recognized internationally for the number of R&D outputs and technologies generated which have been proved commercially/economically viable and technologically sound. Universities could be known for their role in industrial development of their country.

IV. Bridging the Industry and the Academe

The journey of a generated technology or an R&D output from the laboratory to a bench scale and then to pilot model until it reaches a commercial scale is generally rarely smooth and without obstacles. Nonetheless there appears an increasing need, in the light of globalization, for the academe to increase its R&D efforts and generate more technologies which can be commercialized, thus providing the opportunity for the industry sectors of the Philippines to stay competitive in the global market. It is strongly advocated that even though the path to commercialization is marred with obstacles and difficulty there seems to be no other way to travel if the industry sectors want niche in the global arena.

There are generally three (3) modes of commercialization of technology. Technology-driven commercialization is a technology-push from the standpoint of the innovators where the product or process arises from technical novelty. In contrast, market-driven commercialization produces technology from crafts and skills, making use of existing technology even when there is no scientific knowledge involved. Thus, the driving force is the realization that a need exist for new products or processes. Product-and process-improvement commercialization as the term implies, entails making improvements on a technology emphasizing on the fundamental differences in product or process characteristics.

In the Philippine setting, these modes can be adapted by the Innovation Center in various ways. Logically, the Center, with the aim of promoting technologies generated by the UPCOE and NEC, shall push for the commercialization of these R&D outputs to particular industries. At present, the Center, through the UPERDFI, UPCOE and NEC maintains correspondence with some 26 local and foreign manufacturing companies based in the Philippines. The Innovation Center, takes advantage of this linkage between the companies and some government institutions including UPCOE. Likewise, individual industries are constantly tapped to know their current as well as their probable future needs. In the long run, the Center shall be able to establish a system and subsequently strengthening the process of getting feedback on the needs and requirements of industries. This feedback is then and is constantly provided to the innovators of UPCOE and NEC through seminars, fora, and consultations where they can easily adopt the ideas without necessarily compromising the primary purpose of academic R&D. Furthermore, collaborative undertakings between particular industries and the academe through the Center are being studied to understand the current market trends for technological innovations as well as probable working ventures that will facilitate transfer of technology. This activity shall help in making the academe realize what the contemporary market needs.

V. Conclusion and Recommendations

The need to effectively address the technology innovation requirements of the local industries by the academe is enormous. The Innovation Center was established to provide, maintain and strengthen such linkages between the academe and industries. After a year and half of existence, the center moves forward and conceptualizing ways to attain its objectives and vision.

Experience worldwide shows that such mechanism of transferring technologies and ideas does not only benefit the academe and industry but ultimately benefits the community and its people. Aside from financial reward and the perpetuation of R&D activities in the University, the Innovation Center shall also fulfill its moral and social obligation as a member of the U.P. community to be of service to the Filipino nation.

Given below, in matrix form, are the recommendations and initial actions and tasks to be undertaken.

RECCOMMENDATIONS	FOLLOW-UP ACTION	SPECIFIC TASK/S
1. There must be a concerted effort to market the capability of the COE/NEC. It is implied that efforts should be expected in promoting what the COE/NEC could do to help government and industry. This means that there should be good information dissemination program and sound strategies to interest government and industry in the R&D outputs of the COE/NEC and the technical expertise of its staff.	1.a. Assess the manpower/facilities of the COE/NEC. This should be translated into an information package (technical brochures, fliers, data sheets, etc.) which would include technical expertise in specific field/areas, laboratories, R&D and testing facilities (state of the art, speed of work, accuracy, etc.); 1.b. Improve appearance of physical plant, offices, laboratories, and workshops before inviting interested parties; 1.c. Target particular industry or industry associations that may benefit from the COE/NEC's expertise and capabilities. Eventually, these industries may be invited to venture into working with COE/NEC in their probable industry problems.	1.a.1. Prepare general format for department brochure/flyer 1.a.2. Request each academic department through the endorsement of the UPCOE Dean to come up with their own brochure/flyer 1.a.3. Gather/collect department brochures/flyers. 1.a.4. Design brochure/flyer package for COE/NEC. 1.b. Make the necessary recommendation to the UPCOE Dean. 1.c.1. The immediate goal for this activity is to know the industry's perception on the current R&D trust of the COE/NEC.

		Likewise, it would also aim to get their insights on the projects in the archive of IC. 1.c.2. Coordinate with the various departments through the UPCOE Dean as to what companies/industries they have previous and/or have collaborated with. 1.c.3. contact DTI/DOST/ACTETSME for possible contacts to industry. 1.c.4. Prepares list of industries categorized accordingly. 1.d. Invite industries to meet and visit COE/NEC'S laboratories and facilities.
2. Innovations and R&D should be market-driven. It was strongly suggested that tie-ups and industry linkages be strengthened on possibly departmental (academic discipline) and/or industry sectoral basis. The focus should be the needs and requirements of SME's.	2. With respect to the mission of the Innovation Center, the following actions should be taken: 2.a. Establish/Strengthen policies and procedures. These should include: Clear definition of its objectives; clear formulation of the modality of working relationship among the technology generator or provider, the technology user and the Innovation Center(this may include the preparation of proforma MOU's and MOA's); strengthen the process of protecting intellectual property and licensing the utilization of innovations/technologies; and define the formula for "profit sharing" (the last	2.a.1 Information obtained from the interest and local government institutions regarding activities of the IC similar to those organizations may be used in formulating and strengthening some, if not all, the policies of the Center. These activities may include the modalities of working relationships and criteria for screening projects as stated at the right. 2.a.2. The IC should forge a MOA with the UIPO that will detail the would-be working relationship of the two centers.