

# NEW TRENDS OF TECHNOLOGY COMMERCIALISATION - ROLE OF PCSIR

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## ABSTRACT

*Pakistan Council of Scientific and Industrial Research (PCSIR) was established in 1953, with a view to support and develop the technological base of the country. This paper highlights the contributions of PCSIR and its experience in the field of commercialisation of technology. The new concept of technology business-incubators, being introduced in some countries to support industrialization of technologies in aided/subsidized environments, is briefly described. The first attempt to establish business incubators in Pakistan and its outcome is also presented.*

## BRIEF HISTORY

PCSIR had its birth two years after the independence of Pakistan, as the Department of Scientific and Industrial Research under the administrative control of the Ministry of Industries, Government of Pakistan, in 1949. In 1953, PCSIR was formally constituted as an autonomous body under the Societies' Registration Act XXI of 1860. Again, after twenty five years, in 1973, it was reorganized under The Pakistan Council of Scientific and Industrial Research Act (XXX of 1973) passed by the National Assembly, replacing the earlier structure. The organization is managed by a Governing Body and the Members of the Council are nominated by the Ministry of Science and Technology, so that a broad spectrum of views can be made available for an effective executive management of the objectives desired.

During the course of more than 47 years of its existence, PCSIR has made headway in many fields, which are of considerable national importance. Broad areas of achievements relate to water-decontamination technology, solar energy, fuel research, oils and fats, glass and ceramics, fabrication of pilot-plants, instrumentation and calibration, public health, leather technology, edible oils, industrial organics, and pharmaceuticals. The organization is now catering to R&D needs in the vital fields of minerals, metallurgy, food, health, agriculture, drinking water and energy.

The Objectives of PCSIR are summarized below:

- Systematic evaluation, development, value addition and utilization of the indigenous raw materials.
- Research and development work on problems that are being faced by the industrial sector, in order to adopt measures for the application and utilization of research- results.
- Indigenization of technical developments, through adaptation, modification and improvement of existing technologies appropriate to local conditions.
- To plan the establishment of new science-based and science-oriented industries, which would help in improving the export-potential/performance of the country, in providing employment-opportunities at minimum cost, and in creating a self-reliant and self-sustaining industrial base.

## MAIN RESEARCH FACILITIES AVAILABLE

Human resource development and the main research facilities of PCSIR are summarized below:

- Pak-Swiss Training Centres, for technicians training and the award of technical diplomas, at Karachi and Quetta.
- Institute of Industrial Electronics Engineering, Karachi (a degree awarding institute).

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- Four multifunctional research-laboratories, located at Karachi, Lahore, Peshawar and Quetta.
- Fuel Research Centre and Leather Research Centre, both at Karachi.
- Solar Energy Research Centre at Jamshoro, Hyderabad.
- National Physical and Standards Laboratory at Islamabad.
- Scientific Information Centre at Karachi.

## **ACHIEVEMENTS**

PCSIR is the premier research and development (R&D) organization of the country. It has competent staff of 600 scientists, including 100 Ph.Ds, about 70 engineers and a total manpower of 1,400 employees engaged in R&D activities. Table 1 presents the achievements of PCSIR in the field of human-resource development, technology development and its commercialisation. It is appropriate to mention that 156 Ph.D. theses were supervised by its scientists/engineers during the pursuit of their applied investigations at various PCSIR laboratories. The work was duly recognized through the award of degrees by national universities. Furthermore, its Pakistan Swiss Training Centres at Karachi and Quetta have trained about 1,150 technicians in the fields of instrumentation technology, optical technology, and dies-and-mould technologies. The Institute of Industrial Electronics Engineering, Karachi, has so far produced approximately 270 graduate-engineers, who received their degrees from NED Engineering University. It will not be out of place to mention that training in the above mentioned technologies/fields is only available at these PCSIR institutions.

Ever since its inception, PCSIR has developed about 647 technological processes and has obtained about 360 patents, besides publishing about 3,570 pure and applied research papers in national and international scientific journals of repute. To assess the impact of R&D conducted by PCSIR on the economy of the country, a survey was conducted in 1990. This showed that upto 1990, PCSIR had sold 367 processes, out of which 242 were commercialised (39 out of which were resold by the original buyers). Moreover, 150 processes were still in production upto 1990 (Table-1), which resulted in foreign-exchange savings of Rs.7 billion to the exchequer. The annual turnover of processes, according to a conservative estimate, was Rs.612 million, whereas PCSIR budget in 1990 was Rs.142 million (present budget is Rs.279 million). Thus, PCSIR is significantly contributing in the economic development of the country, in spite of serious manpower and financial constraints faced by PCSIR over several decades. The main reason for below-par level of commercialisation of PCSIR technologies is the lack of a law for the protection of intellectual property rights in the country.

## **WHAT TO DO NOW?**

Many developing countries are encouraging investment in the industrial sector for their economic growth. In order that efforts of these countries may succeed, a thrust towards science-based technology development is the single most significant element required. The usual support needed by techno-entrepreneurs in these countries is a reliable access to intellectual property and technical expertise. The technology-based businesses, particularly in the early development phase, need access to good infrastructure, management and technical knowledge. Such an opportunity is being provided through the establishment of "Technology Business Incubators (TBIs)" in a large number of developing countries, such as China, Italy, Poland, Turkey, Nigeria, Mexico, India and Indonesia, to mention only a few. A TBI is a controlled work-environment designed to role-model the development and commercialisation of technologies, through successful implementation of the TBI concept. During a 10-year period, ending 1999, China had established 110 TBIs having an incubation area of about 2 million sq mtrs and over five thousand enterprises. Out of these enterprises, about two thousand graduated successfully and created nearly one hundred thousand job- opportunities. Pakistan now stands to gain a lot from the Chinese experience, through the Science & Technology bilateral protocol.

Recent studies indicate that new and emerging enterprises have developed more successfully when operating in proximity to universities, R&D institutions, trade and networks of technology, outsourcing through the internet. PCSIR, due to vast experience of interacting with these elements, is most suited for initiating the process of TBI development in the country. Some of the outstanding merits of PCSIR in this regard are given in the following paras.

**Table - 1: Achievements of PCSIR (1953 to 2000)**

Sr. No.	Name of Field	Number of Beneficiaries
<b>(A)</b>	<b>Human Resource Development:</b>	
1.	Supervisory guidance & laboratory facilities provided to Ph.D. students:	156
2.	Engineers produced B.E.(Industrial Electronics Engineering):	272
3.	Diploma of Associate Engineers: (i) Instrument Technology (ii) Dies & Moulds Technology (iii) Optical Technology	878 241 <u>30</u>
		Total: <u>1149</u>
4.	Post Diploma Certificate in Industrial Technology:	224
5.	Short Courses Certificates awarded to in-service Engineers/Technicians:	1300
<b>(B)</b>	<b>Scientific Achievements upto 2000:</b>	
6.	Research Publications (approx.):	3750
7.	Patents Obtained (including 29 foreign patents):	360
8.	Processes leased out:	647
<b>(C)</b>	<b>Technological Achievements upto 1990:</b>	
9.	Processes sold:	367
10.	Processes Commercialised:	242
11.	Processes in Production:	150
12.	Re-sold Processes (by Purchaser):	39
13.	Saving in Foreign Exchange:	Rs.7.00 Billion
14.	Annual Turn-over:	Rs.612 Million
15.	PCSIR's Budget (1989-90):	Rs.142 Million

The principal objective of PCSIR is to promote the overall technological development of the country. As such, it is the premier national R&D organization, duly chartered to do industrial research. Its scientists and technologists, within this context, as mentioned earlier, have contributed significantly. PCSIR has four multidiscipline and five mono-discipline laboratories, which are regularly visited by SMEs numbering over three thousand ad-hoc technical jobs annually. PCSIR laboratories are located close to universities and in close proximity to major industrial estates in the country.

Establishment of TBIs at various campuses of PCSIR, in view of the above- stated factors, meets the basic criteria of success of TBIs. It is, therefore, proposed that, in the first instance, TBIs may be set up at the Karachi and Lahore Laboratories Complex, where sufficient land is also available for initiating such a programme. These TBIs, on completion, will each have a covered area of 2,500 sq mtrs, with about 20 resident companies, 150 workers, and the expected sale of about Rs. 50 million at the end of their third

year of existence. By the third year, these TBIs are expected to graduate 15 enterprises. The facility will be fully equipped to extend the following services:

- Meeting Places: conference rooms, assembly-recreational hall.
- Technical Exchange: product-display rooms, consultation rooms.
- Personnel Resourcing: training rooms, computer/audio-visual rooms.
- Information Services: technical and market information, database.
- Business Support: testing, analysis, measurement devices, teleconferencing.
- Technical Support: provision of intellectual-property link-up with universities/technical institutes.
- Technical Consultancy: panel of technical experts.
- Law Services: patent information, law consultants.
- Financial Support: banks, risk-venture companies.
- Technical Incubation: laboratories, pilot operation for technology testing.

An additional likely benefit of setting up of the proposed TBIs at PCSIR Laboratories is that, with the above mentioned facilities and services, researchers and inventors may become attracted to the setting up of their own high-tech companies for transferring their scientific results into products. The proposed TBI complex will thus become a “model middle organization” between research and manufacturing.

## **BUSINESS INCUBATORS IN PAKISTAN**

Askari Commercial Enterprise (ACE), a subsidiary of Army Welfare Trust, started rehabilitation of 500-600 army officers per year, who take premature retirement from the services. They started this project in 1997, with the help of UNIDO and Experts Advisory Cell, Ministry of Industries, Government of Pakistan, Islamabad.

ACE runs reorientation courses of six weeks to provide 25-30 candidates, with the basic knowledge and mind set for their venture. So far, they have managed 13 courses. From these participants, they select potential candidates to provide subsidized logistic support, such as office with furniture at a monthly rent of Rs.2500-3000, free guidance throughout their stay, and services of supporting staff, telephone, fax, photocopy, e-mail at no-profit-no-loss basis. Such candidates are allowed to stay upto 12-18 months and then they are encouraged to move into their own premises. So far, they have 78% success rate. It may be noted, however, that the ACE Business Incubator is not a technology-based incubator. Therefore, the proposal of setting up of TBIs at the PCSIR laboratories will, infact, be the first initiative of its kind in Pakistan.

## **CONCLUSIONS**

For the success of technological development in the country, the concept of Technology Business Incubators should be given a serious thought and implemented as proposed above, as soon as possible.

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