PAKISTAN COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH (PCSIR)

Introduction

The Government of Pakistan established PCSIR in 1953 as an autonomous body to build a strong scientific and technological base for the economic progress of the country. In the first phase of its evolution (20 years, 1953-73) multi-functional laboratories and institutions that were engaged mainly in basic research were established in major cities. Human resource programmes were also developed in Science and Technology (S & T).

In the second phase (1973-1993), the council was given more autonomy through PCSIR Act 1973. Applied research was emphasized to maximize utilization of indigenous resources, raw material and technologies. Import substitutions were an economic objective of the Government and PCSIR played a significant role towards advancing that goal. Over the past 50 years.



PCSIR Head Office, Islamabad

Objective

To undertake, promote and guide scientific and technological research related to problems connected with the establishment and development of Pakistani industries, and disseminate the results of research to various sectors of the economic development community in the best possible manner.

Organizational Structure

The Chairman is the Chief Executive Officer (CEO) of PCSIR. The Council consists of 21 members including the Chairman. The Federal Government nominates 11 members, while 4 members are ex-officio from Provincial Governments and 6 are representatives of the industries. The Council is the supreme policy-making body and at least two Council meetings are held annually. The executive organ of the Council is the Governing body which consists of fours members:

Laboratories / Units

PCSIR has four multi-functional laboratories at Karachi, Lahore, Peshawar & Quetta. These laboratories have various research divisions under divisional heads working on specific areas of research and development, as follows:

- Applied Biology & Marine Resources

- Industrial Chemicals
- Pharmaceutical & Fine & Food Sciences
- Minerals & Metallurgy, Glass & Ceramics
- Industrial Wastes Recycling, Natural Drugs
- Minerals Technology
- Agro Based & Rural Technology and Chemical Engineering



PCSIR Labs Complex, Peshawar

PCSIR has four mono-functional research centers, viz. Leather Research Centre, Fuel Research Centre, Hyderabad Laboratory, National Physical & Standard Laboratory, Demonstration cum Training Centre and Institute of Industrial Electronics Engineering (IIEE).

PCSIR laboratories Complex, Karachi, National Physical & Standard Laboratory, Islamabad and Leather Research Centre, Karachi have become the first accredited laboratories of Pakistan for ISO-17025. This prestigious award was bestowed upon PCSIR by the Pakistan National Accreditation Council (PNAC), the supreme national body authorized by the Government of Pakistan to accredit the organizations found eligible for the purpose.

The award of ISO-17025 to PCSIR laboratories authenticates that the services offered by these laboratories are credible and according to the application of the international Standards as specified in ISO-17025. This measure is a step forward of the country to meet WTO challenges. By availing the accredited testing and calibration services offered by PCSIR, the industries, manufacturers, traders etc. of Pakistan will be able to get their products accepted worldwide according to the requirements of World Trade Organization (WTO).

Main Activities:
The broad-based activities of the PCSIR encompass almost the entire industrial sector in the country; for the industrial units in operation have their ground-work in science and technology in which the PCSIR is both prominent and all too visible an organization on the national plan. The PCSIR being the foremost industrial R & D organization is the largest producer of indigenous technologies in an

organized fashion. Following are some of the areas where PCSIR has strength and potential to serve the local industry provided its capabilities are augmented / enhanced by suitable inputs :

(a) Evaluation of Locally Available Raw Materials

Pakistan is replete with respect to natural resources and their exploitation should have been the top priority in the process of industrialization of the country but instead of using local materials, a consumer industry based on imported raw materials was largely established.

PCSIR main thrust in the starting years was to investigate the physico-chemical composition of the locally available raw materials and to find out their possible utilization. Out of the large number of research publications (over 6702) that PCSIR produced during the period, 70 percent relates to the evaluation of local materials. The data thus generated is the single most important contribution of the PCSIR, which no other organization in the country can claim. It is available in the form of research papers, technical bulletins, brochures and reports, etc. It covers the areas from minerals, ores, clays, forest produced herbs, plants to marine and animal wastes. PCSIR can undertake survey and evaluation studies of raw materials and products on behalf of the industry.

(b) Process and Product Development

The Scientists and Technologists of PCSIR developed 1362 industrial processes and products and 461 numbers of patents, mostly based on the locally available raw materials. Out of these nearly 1127 processes have commercially been exploited on industrial scale. It has also executed around 50 ADP projects, (upto 1999), which were mainly pilot plant studies, based on the data generated on the laboratory level.



Flue Gas Analyzer



Temperature Control System

(c) Investigative Analysis and Import Substitution

A large number of formulated products are being imported at exorbitant rates resulting in the expenditure of costly foreign exchange by the textile, leather, pharmaceutical, cosmetics, household chemicals, food additives and consumer products industries in the form of emulsions, surfactants, resins, adhesives, plastic parts, perfumes, flavors and other chemical and non-chemical products. Most of these items are imported under brand names. The expertise and technical manpower available in the PCSIR have been able to decode and analyses over 2000 of these products and helped the local SME's in the development of import-substituted materials.



Herbal Products

(d) Analytical and Testing Services

- PCSIR is capable of undertaking large number of tests of raw materials and industrial products and can provide physical, chemical, chromatographic and spectroscopic analytical services in the diversified fields.
- It has the requisite highly qualified, trained and experienced technical manpower not available anywhere in one place in Pakistan.
- It has the necessary infrastructure in terms of quality control equipment and analytical instruments and laboratories.
- It has the capability to investigate, improve and introduce latest methodology of testing and quality control in the production and application.
- PCSIR at present is serving over 4000 SME's / clients all over the country annually in quality control, analytical and testing area.

(e) Quality Control Services to the Exporters

The major exports of Pakistan are textile, leather, food, sports and surgical goods and products, which are based on locally available raw materials. The exports are essentially made to western European countries, America and Japan. These countries are becoming more quality conscious and introducing various parameters and checks to enforce the quality of their imported products. ISO 9000 and 14000 series of standards are being brought in to monitor the desired quality. Pakistan has faced much

competition in the region for exports and in order to remain competitive there is a need to educate, support and provide technical and quality control services to the producers and exporters of goods.

PCSIR is doing its best to extend these services to the exporters. Textile and leather exportable items are examined for forbidden dyes, PCP, formaldehyde, heavy metals, pesticides and fungicides and host of other undesirable chemicals on the request of the exporters and issuing analytical reports / certificates which are being accepted in European and elsewhere. PCSIR has developed credibility for these test reports.

Similarly food items being exported by Nestle and others are being tested for their microbial contamination and shelf life.

Exporters of surgical goods, and sports goods are also getting technical and analytical help from PCSIR. Under the supervision of Environment Protection Board (EPB) and technical guidance of Mineral and Metallurgy Research Centre of PCSIR, a Material Testing Laboratory has been established at Sialkot to Cater to the needs of the exporters of that area and PCSIR is imparting training to the technical staff posted in Material Testing Laboratories (MT Labs).



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(f) Services to Government Departments and NGOs

Various Government departments such as Customs, Excise, Police, Administration, Health and NGO's avail the analytical testing and advisory services of PCSIR in resolving disputes, fake and genuine products categorization investigative matters, narcotics, screening of medicines for steroids, etc.

(g) Help in Crisis Situations

Due to the availability of diverse expertise and extensive laboratory infrastructure, PCSIR enjoy the focal point in the crisis situations and its scientific and technical staff are always ready to extend to the local Administration to technical help, solve and ameliorate the situation.

(h) Environment and Pollution Control

The expertise available in PCSIR in the field of Environment and Pollution Control is not only training its own S & T staff in the assessment, monitoring and control systems of air, water and soil pollution but is also helping the local industry for self-monitoring and impact assessments. It is also helping the Ministry of Environment, Local Government and Rural Development, Planning Division, Ministry of Industries in

framing and implementing National Environment Quality Standards (NEQs) of air, water, industrial liquid and solid effluents and gasses emissions. PCSIR is also assisting the local industry in acquisition, modification of existing plants, handling of hazardous wastes, treatment of effluents, control of emissions, etc. for environmentally clean and safe productions. PCSIR laboratories have already been recommended by the EPAs as environmental laboratories to carry out testing of environment samples. PCSIR scientists / technologists are helping Ministry of Environment to prepare, organize and execute training programmes in the field of environment monitoring and assessment.

(i) ISO-9000 / 14000 Certification

On the introduction of the ISO-9000 series of the standards, the specified quality of the products has become a vital issue for all the companies of the country to conduct their business according to the laid down standards.

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In Pakistan PCSIR is the only organization, which is capable of doing quality management work successfully as it has all desired facilities available within its premises in each of the province of the country. PCSIR has over one hundred different types of latest equipments and highly trained manpower to test and evaluate a factory's raw materials, in process inventories, finished products and the packed products which are to be marketed. The manpower of PCSIR is also capable of doing the Environmental Impact Assessment studies in and around the vicinity in which the plant is operating.

PCSIR is extending its technical services to a project funded by the Ministry of Commerce and MoST, Government of Pakistan to survey and examine various industries and make recommendations to the government for a subsidy amounting to Rs. 2 lacs to the industry who intend to adopt and implement ISO-9000 system under the project entitled, "ISO 9000 Certification Incentive Programme" Some 1180 industries have been examined by PCSIR scientists.

(j) Workshops, Seminars, Training Programmes

PCSIR arranges seminars, workshops and training porogrammes in the specialized fields for the senior technical staff of the industry in order to update the knowledge of industrial workers and to teach the modern techniques, skills and latest methods for improving the quality and standards of their industrial products. Some of the workshops and training courses held in PCSIR which were well attended and greatly appreciated by the relevant industry included:

- "Cathode Protection Techniques" for solving corrosion problems in the industry.
- New Techniques in Metalography.
- Technical training on ore beneficiation to the staff working at the Saindak copper ore project.
- 129 Technical Managers, Quality Control Managers, Calibration Managers received training in three batches in the sophisticated field of Metrology and Calibration.
- Various training programmes were held in leather processing, leather finishing, and quality control for the employees of the leather industry.
- Workshop on "Essential Oils, perfumes and Flavors" was held for the benefit of Cosmetics toiletries, flavors, perfumes household chemical manufactures.
- Workshop on "food Preservation" was held for the food and beverage industry.

- Training programme in "Cereal Technology and mycotoxins" for the RCD countries.
- Workshop on "Oilseed Expelling Systems" for the Expeller manufacturers.
- Seminar on "Synthetic Dyes and Intermediate Chemicals" for the local dye industry

(k) Pre-Feasibility, Feasibility and Techno-Economic Studies

PCSIR has experienced and trained scientific and technical manpower to undertake these studies on behalf of the industry.

A number of technical reports and pre-feasibility studies has been executed by PCSIR on the request of the local industry, Government agencies such as PUNJMIN, RDC, NDFC, SDA, BDA for survey, evaluation, upgrading of raw materials required and projects based on the locally available raw materials.



Coal Gasification

(l) Rural Support Technologies

PCSIR has developed a number of technologies for the rural areas of the country including:

- Improved and modified village level sugarcane crusher developed under US AID programme.
- Modified Oil Seed Expeller developed under IDRC, Canada funded project.
- Development of erucic acid and glucocinolate-free rapeseeds (crucifers) under PL-480 project.
- Bench Mark of Sugar Recovery from sugarcane for the farmers, project funded by MINFAL, Government of Pakistan.
- Seed Decorticating Machine.
- Nut Cracking Machine - hand operated as well as power operated for Agha Khan rural support programme.

- Potable water technology.
- Carpet making machine.
- Household disinfectants.
- Preservation of vegetables and Fruits Technologies.

Achievements

PCSIR has developed 1668 processes out of which 1163 have been leased out to different industries. PCSIR has registered 507 patents and has more than 7500 research publications at its credit.

On-Going Projects

S. No.	Project Name
1	Up-gradation and Modernization of Pilot Plants at PCSIR Labs. Lahore
2	Renovation & Upgrading of Existing Infrastructure of PCSIR Labs, Peshawar
3	Up-Gradation, Balancing, Modernization and Refurbishment (BMR) (NPSL) Pakistan
4	Up-Gradation & Modernization of Pilot Plants of PCSIR Laboratories Complex, Karachi
5	Up-gradation & Modernization of Workshop of PCSIR Laboratories Complex, Karachi
6	Up-Gradation and Modernization of Workshop Facilities at PCSIR Laboratories Peshawar
7	Up-gradation and Modernization of Building of PCSIR labs Complex Karachi
8	Up-gradation and Modernization of workshop at PCSIR Labs. Lahore
9	Development and Application of Plant Tissue Culture Technology for the Production of Stress Tolerant Crop. PCSIR Labs. Complex, Karachi
10.	Up gradation Renovation / Reconstruction and Modernization of Animal House (For Rearing / Breeding & supply of Research Experimental Animals) for R & D Activities & Drugs Development / Evaluation.

Future Plans

- ❖ Setting up of Technological Business Incubator (TBI) Centers at Lahore & Peshawar.
- ❖ PCSIR labs may be mandated as National certifications Labs for export and import of Halal food.
- ❖ Establishment of Merit based recruitment system.
- ❖ Process / Technology development on bankable feasibility.
- ❖ Revitalization and strengthening of liaison with private sector.

- Extension of accreditation of 17 more labs by United Nations Industrial Development Organization (UNIDO)

- Establishment of Centre of Excellence in ;
  - Alternative Energy & Conservation
  - Food
  - Establishment of export oriented R & D institutions for mango, textile and dates.