The Industrial Technology Development Institute (ITDI) is the Philippines’ premier research and development institute (RDI) under the Department of Science and Technology (DOST). It provides the technological and technical services requirements of industries from all over the country. Its vision-mission statement is: “Excellence in propelling development as a provider of technologies and services to industry - To make local industries globally competitive.” Thus, the ITDI plays a crucial role in the country’s industrialization programs.

The ITDI is the oldest RDI under the DOST now counting 102 years of existence. It started out in July 1, 1901 as the Bureau of Government Laboratories (BGL) through the Philippine Commission Act No. 156. Then headed by the Americans, the BGL pioneered scientific endeavor in the country through its biological and chemical laboratories, science library, and the serum laboratory of what is now the Department of Health.

In 1905, the BGL was reorganized into the Bureau of Science to expand its functions and a chemist, Dr. Angel S. Arguelles, became the first Filipino national to head the agency in 1934. Thereafter, the bureau progressed through a series of reorganizations coupled with changes in nomenclature, scope and function. From mostly basic researches on a broad spectrum including flora and fauna, geology, mining, special materials, pests and diseases and in the field of medicine in response to prevalent illnesses, the Institute has metamorphosed into a multidisciplinary research and development institute focused on industry-oriented research.

OPERATIONAL STRUCTURE

ITDI has evolved from a functional to a matrix organizational structure to address multi-faceted industry problems and requirements particularly from the small and medium enterprises (SMEs).

The Institute operates 12 divisions and three program centers. Seven of the divisions undertake research focused mainly on seven disciplines, namely: food processing, material science, environment, chemicals and minerals, microbiology and
genetics, electronics and process control, and fuels and energy. These R&D divisions likewise provide technical services to their respective sectors.

One division performs testing and analytical services for industry to help them meet the required standards for their materials and products. The remaining four divisions provide support to the requirements of R&D divisions related to finance, administrative matters, planning, monitoring and control, technology transfer and promotion, and information dissemination.

The three programs, namely, Packaging R&D Center (PRDC), the National Metrology Program (NMP), and the Cleaner Production Center (CPC) cut across the organization and tie-up with the different R&D divisions to address industry and environmental problems in a multidisciplinary approach. These centers extend their services to the provinces to accelerate the growth of the SMEs in the countryside.

The ITDI also has two external structures to enhance its collaboration with industry. These are the Industrial Research Foundation (IRF) and the Surface Coatings R&D Center (SCRDC). The IRF, which was established in 1983, is an independent not-for-profit foundation that assists the ITDI in marketing its capabilities. A Board of Governors composed of senior industry and government executives managed the IRF. The IRF was instrumental in setting up the SCRDC in 1991. SCRDC is a consortium of four industry associations representing the paint, inks and adhesives, and specialty chemicals industries. It has been supported to a considerable extent by a JICA program that has provided a technical expert from Japan, training in Japan, and a range of equipment.
HUMAN RESOURCES COMPLEMENT

At present, ITDI has 413 regular employees and 42 contractual employees. About 50 percent of the regular workforce is directly involved in R&D while 30 percent provide the technical services, i.e. analytical, training, metrology and calibration, library, economics and planning of the Institute. The remaining 20 percent is assigned in administrative works.

R&D DISCIPLINES

ITDI’s R&D Programs are anchored on its vision of propelling development while addressing the national call for job creation to help alleviate the plight of the marginalized sector of society. The R&D activities are focused on seven major disciplines or areas of research undertaken by the respective divisions of the Institute, as follows:

Food Processing

Research is focused on the development of export products from priority commodities, intermediate raw materials and semi-processed products. Studies are also done to develop shelf-life stable processed food, establish standards for ethnic foods in support of the local food industry. Scale-up production studies are undertaken on developed food processes for application on SME-scale. In addition, the division provides a variety of technical services to industry. Expertise is on the following areas: product/process development, food analysis, food engineering, and manpower training. Completed researches are the development of acetator for natural vinegar production, clean smokehouse for smoked fish, sugarcane based products, mobile calamansi processing.

Materials Science

Research is focused on basic and applied R&D on materials science and engineering. Technical services are likewise provided to industry. Areas of expertise include: ceramics, plastics/polymers, and special materials. Among the new materials developed are: HAP based orbital implant, landfill liner using indigenous clay and porous ceramics for wastewater treatment. The clay liner formulation was adopted in the construction of the Bais City municipal sanitary landfill, the first ever clay landfill in the Philippines - a project of the Bais City local government and German Development Service. Her Excellency President Gloria Macapagal Arroyo graced the
inauguration ceremony of said landfill on April 2, 2003. Recently, the division developed two types of protective masks to fight against the SARS virus using new materials.

Environment

R&D studies are focused on industrial pollution and pollution control, environmental impact assessment, waste utilization and recovery, waste treatment for various industries, and utilization of agro-industrial wastes for the recovery of useful products. Process and equipment designs for pilot plant and/or commercial scale applications are also undertaken including technical assistance to industry regarding environmental concerns. Among the technologies developed is the modified UASB for industry wastewater treatment.

Chemicals and Minerals

R&D studies are focused on the production of organic, inorganic and pharmaceutical chemicals and other related products using indigenous raw materials and minerals; and scale up studies for chemical process development. Linkages with industry are fostered through various technical services and joint R&D projects. Expertise is centered on: process development, synthesis of chemical compounds, oil extraction and medicinal plant studies, and design and fabrication. This division is responsible in the development of enterprise module for virgin coconut oil (dry process), bath soap and shampoo.

Microbiology and Genetics

Research is on the production of organic acids, organic solvents, enzymes, microbial inoculant, biocides and biomass for agro-industrial use, and strain improvement of industrial microorganisms. Laboratory processes are translated into pilot and commercial scale operations. Lines of expertise involve: microbial fermentation, strain
improvement, bio-process development, enzymes application, and waste bioremediation.

**Electronics and Process Control**

Research centers on the various fields of electronics specifically on industrial instrumentation, process monitoring and control, and mechatronics and robotics; as well as design and fabrication of electronics and support components including tools and fixtures, modules, circuits, and equipment. Experts among the staff provide consultation and training to industry, particularly in the area of printed circuit board (PCB) design and fabrication, among other services.

**Fuels and Energy**

Programs are focused on energy conversion and utilization technologies/systems, energy efficiency for industrial processes, and technology exchange and acquisition. Energy audit and transfer of efficient energy technologies are among the technical services provided to industry. They have fabricated a burner for waste to energy conversion of glycerin pitch industry by-product.

**INSTITUTIONAL CAPABILITIES**

The matrix approach to its operation has allowed the ITDI Divisions to adopt a systems approach to addressing a broad spectrum of issues/problems associated with industrialization, technological and sustainable development using the capabilities of its seven R&D areas. These capabilities aim to upgrade the production capacities of the SMEs through programs/projects that would enable them to effectively manage technological progress and competition with a conscious effort to integrate broader social responsibility in their operations. These programs and projects are as follows:

**Waste Management**

Projects under this program address problems on disposal, treatment, reduction, and resource recovery. ITDI is aggressively promoting the transfer of its technology on the accelerated biodegradation of solid waste. This composting technology is a fast rate composting process that utilizes a bioreactor, an optimum feed formulation and a microbial inoculant that accelerates the composting process. This technology is capable of processing 52% (representing biodegradable waste) of the total solid wastes generated daily by a small community. The technology has been demonstrated in the local communities and other institutions.
To fast-track technology transfer, the ITDI has fabricators to produce 500 units of the bioreactor over a span of 500 days.

**Cleaner Production**

Through its Cleaner Production (CP) Center, ITDI promotes the integration of cleaner production principles in R&D, technology transfer, manufacturing, and the various other sectors of industry for sustainable development. Local industries are provided with technical information and assistance in adopting clean production technologies and waste reduction techniques. The program activities include: a) developing protocols and guidelines that will direct and facilitate effective promotion of the CP option; b) technology evaluation and verification; c) conduct of capability-building services such as training courses and seminars; and, d) industrial extension service. The program aims to make ITDI operate as CP center of the Philippines by 2004 – in view of its multidisciplinary character.

Along the concept of CP, ITDI is developing production systems in food processing where there is practically “zero waste”. In addition, ITDI is integrating its CP program with clean energy and energy efficiency. Success stories on CP are featured in the Post-CP, a publication of the center.

**Packaging**

Through its Packaging R&D Center, ITDI aims to make Philippine packaged products globally competitive through the development of attractive, inexpensive, appropriate and environment-friendly packaging materials and designs that conform to international standards. Among the services of the Center are: technical consultation, information dissemination through a broad database, labeling and structural design, product-package compatibility tests, shelf life testing, collaborative R&D, and seminars and training. The PRDC has projects aimed at making local products particularly processed food globally competitive through the application of appropriate/innovative packaging, institutionalizing linkages and accelerating the implementation of its training program on label design.
Metrology

ITDI's program on metrology responds to the call for accuracy in the units of measurement for product standardization, higher quality and competitiveness of local products, and protection of the consumers. This program is being handled by its National Metrology Laboratory (NML), which was established in 1999. The NML has laboratories focusing on mass, length, temperature & humidity, electricity, time interval, force and pressure, density and viscosity, and volume and flow.

Enterprise Modules

The concept of an enterprise module (EM) was formulated in 2001 as an innovative means of transferring and commercializing technologies with market potential and as a way of enticing prospective investors. It demonstrates the complete production system thereby assuring the technology's viability in terms of reproducibility and commercialization. The EM package includes Business Opportunity Plan (BOP), marketing plan, product/process description, plant layout, and equipment specifications. The EM also served as a demonstration-cum-production unit and an R&D facility for developing second-generation technologies. So far, the institute has developed EMs on virgin coconut oil, a smokehouse for smoked fish, bath soap, acetator or accelerated vinegar production, etc.

Process Engineering

This program comes as a tool to solve production bottlenecks or shop floor problems and to translate ITDI developed processes into production systems. Through this program, ITDI integrates waste treatment systems, safety measures and process control systems in the enterprise modules. It also touches on the development of complex design systems that can be used for a wide range of products or a wide variety of processes in a plant.

Post Harvest Handling/Near Farm Processing/Packaging

This provides encompassing solutions to problems on maintaining the quality and extending the shelf life a fresh produce from the time and place of harvest to the time and place of consumption, with minimum loss, maximum efficiency and maximum returns to all involved. The program also addresses processing and marketing problems of seasonal crops by providing alternative solutions such as developing value-adding qualities to the
product to ensure continuous supply beyond the harvest season. Among the technologies developed are near-farm/mobile processing of calamansi juice concentrate, strawberry leather and in-syrup and modified atmospheric packaging for mango export done in cooperation with Korean Food Research Institute.

**SUPPORT FOR INDUSTRY**

In support of the ITDI mission, the Institute provides various services or interventions to industry to help modernize the production sector and improve their productivity. Such services cover a wide range of industry sectors and vary in the size of firms assisted and in the level of assistance.

Following are some of the Institute’s major services to industry:

**Research and Development (R&D)**

Multidisciplinary applied research in the fields of industrial manufacturing, mineral processing, energy and environment, using local raw materials.

**Technology Transfer and Contract Projects**

Transfer of mature technologies with techno-economic viability, from product/process development to techno-assessment to commercialization.

**Tests and Analyses**

Recognized as the national agency for tests and analyses, ITDI plays a critical role in product standardization and testing by providing analytical and testing services to industry and government agencies for various products and materials.

**Food engineering services**

A package of services offered to the local food industry and other institutions that provide them with technical assistance to improve product quality and productivity in their operations, and enable them to comply with the stringent Sanitary and Phytosanitary System requirements of international trading under the World Trade Organization (WTO). Such services include engineering consultancy and technical advisory, process development and scale up, design and fabrication of food processing equipment, and design, layout and set up of processing plant.
**Energy Audit**

A critical examination of an energy consuming facility to help improve energy efficiency and productivity by identifying areas where energy waste can occur and recommend energy saving opportunities. Services offered include audit of complete facility, energy equipment like boilers, dryers, motors and building, technical evaluation of energy conservation projects, and in-house training.

**Industry training and skills development**

Hands on experience in manufacturing and various industrial processes, and demonstration/training on various technologies for income generation.

**Scale up production facilities**

Production facilities on a scaled up level for various technologies or processes are also available to industry such as those on: coconut oil milling and refining, food processing line (canning & dehydration), and materials processing (ceramics, plastics).

**Technical information and promotion**

Publication and dissemination of information on S&T services, technologies and other technical inquiry data and promotion assistance to clients in various media channels.
INSTITUTIONAL LINKAGES

ITDI also forges and maintains close linkages with industry and other government agencies to facilitate the implementation of its many projects and programs. Likewise, international linkages and international cooperation in S&T are aggressively pursued to facilitate the exchange of research findings and bring about opportunities for the development of R&D programs of mutual interest, financial and equipment grants, expert/consultancy services, exchange visits, and information exchange. Linkages have generated resources for research, training, and attendance to international conferences/seminars.

ITDI's office is located at DOST Compound, Gen. Santos Ave., Bicutan, Taguig, Metro Manila and can be contacted via telephone on (632) 837-2071 loc. 2215; Telefax: (632) 837-3167 or via e-mail: epl@dost.gov.ph

For more details, visit http://mis.dost.gov.ph/itdi.