

Executive Summary

Introduction

R&D and technology related activities form an important link in the innovation chain and are a measure of innovation capabilities of a country. A number of parameters like expenditure on R&D, availability of scientific and technical manpower, patents sealed, products and processes developed, import substitutes developed, designs & prototypes developed and consultancy services rendered by R&D institutions in different sectors are also indicators of a country's technological capabilities.

India has a strong set of S&T policies and institutional mechanism including a chain of 38 research laboratories under Council of Scientific and Industrial Research (CSIR). These R&D institutions are known to be equipped with internationally comparable facilities and the experts in certain areas are capable of providing R&D services besides carrying out R&D activities.

The increasing trend in internationalization has opened up new opportunities for business development and export of R&D institutions all over the world. The GATS Agreement (General Agreement on Trade in Services) of WTO also provides R&D services export opportunities for research labs of member countries and brings forth new challenges for them to compete internationally.

Objective of Study

Recognizing the business potential for R&D services from India, a preliminary research study related to exportable R&D services from the CSIR system was assigned by DSIR to Centre for International Trade in Technology (CITT) at Indian Institute of Foreign Trade (IIFT). The objectives of the study were:

- I. To find out from the survey of 38 laboratories of CSIR, their facilities and potential for export market of R&D services.

- II. To identify the constraints being faced by CSIR laboratories in exporting R&D services and their views to overcome those.

Methodology of Study

A study team consisting of representatives from DSIR, CSIR and CITT-IIFT was constituted. The team work under the guidance of Dr. S.P. Agarwal Head CITT, IIFT. The team finalized the methodology for collection of data through field surveys, visits to the laboratories and personal discussions with the laboratories. A questionnaire was designed for the purpose of data collection.

The questionnaire was sent to all the 38 laboratories of CSIR. The manner in which R&D services can be delivered were categorized into 8 “delivery modes” viz. (i) training (ii) testing and evaluation (iii) consultancy (iv) IPR services (v) surveys and epidemiological studies (vi) technology transfer (vii) turnkey projects and (viii) contract / sponsored research. The last area mentioned above i.e. contract / sponsored research was further sub-divided into (a) design (b) product development and (c) process development. The laboratories were requested to provide information under the above categories of R&D services with respect to their core competencies. The laboratories were also requested to inform about the major facilities available, patents taken, papers published, R&D services given to industry or other organizations in India or abroad, major constraints in offering their services in India and abroad and also invited their suggestions to overcome the constraints. The study team also had personal interactions with scientists of various laboratories besides visiting selected laboratories.

Analysis

For the purpose of analysis the 38 laboratories of CSIR were grouped into following 4 main groups:-

1. Biological sciences group
2. Chemical sciences group
3. Engineering sciences group
4. Physical & Information sciences group

. The data was compiled, classified and tabulated according to the objectives of the study and the analysis was carried out as per the information supplied by the laboratories about the manpower available, Core areas of competency, patents filed and granted in India and abroad, papers published, major R&D facilities available and potential exportable R&D services laboratory wise while analyzing the individual laboratories under the 4 main groups, mentioned above, in chapters 3,4,5 and 6 in the report.

Each chapter starts with the names of the laboratories under the group with the analysis of the group as a whole followed by analysis of individual laboratory.

The main core competencies of the 4 groups are summarised below:-

Biological Sciences Group: There are 11 laboratories in this group. The main core competencies identified in this group of labs are biotechnology, bioinformatics, cell biology, environmental biology, tea sciences, floriculture, drug design and development and food biotechnology etc.

Chemical Sciences Group: There are seven laboratories in this group. The main areas of core competencies in this group are – process design and engineering, membrane science & technology,

specialty chemicals: organic synthesis, catalysis, polymer, arid zone plantations, electrochemical and electrochemical metallurgy etc.

Engineering Sciences Group: There are 13 laboratories in this group. The main areas of core competencies in this group are - environment impact assessment, waste water treatment, refractory and advanced ceramics including bio-ceramics electro-ceramics and non-oxide ceramics, mineral beneficiation, extractive metallurgy, characterization and synthesis of composites, wind tunnel modeling & testing, transmission line towers, road research and highway design, rapid prototyping and tooling, disaster mitigation and earth quake resistant structures, coal liquefaction and gasification and mining technology etc.

Physical and Information Sciences Group: This group comprises of 7 laboratories. The main areas of core competencies in this group are – material science and characterization, radio & atmospheric science, superconductivity, cryogenics, ecosystems, marine technology assessment of mineral, underground water and hydrocarbon along with their exploration & management, instrumentation, power electronics and studies on various important subjects.

Observations

- i. Some national laboratories under the CSIR system have already taken initiatives to forge partnerships with MNCs and provide R&D services in areas such as drugs and pharmaceuticals, catalysis, aero-space designs & engineering, bio-technology, chemicals, computer aided designs, etc. The partnership of Boeing with NAL, or Mobil with IIP, or Glaxo SmithKline and Becham with IICT are just a few examples of such partnerships. Recently, General Motors, Daimler Chrysler and Procter & Gamble have also joined hands with CSIR laboratories.

- ii. Inclination & orientation towards international marketing & export of R&D services is, however, lacking in most labs.
- iii. Level of international exposure in some labs needs to be enhanced.
- iv. In general, labs intimated lack of information about foreign markets and bureaucratic bottlenecks, as the main impediments for developing the export potential of their R&D services
- v. Most labs need a pro-active approach to identify specific markets for their R&D services.

Recommendations

- i. CSIR may evolve a well structured business plan / strategy for international marketing of R&D Services with country specific as well as service specific targets in a given time frame, keeping in view the developments taking place globally as a result of WTO-GATS negotiations or otherwise.
- ii. CSIR should encourage adoption of 'corporate-culture' in its laboratories with adequate debureaucratization and restructuring, retaining at the same time science based research environment.
- iii. A corporate strategy may include evolving an appropriate structure at the CSIR headquarters that would facilitate export of R&D services with active participation of laboratories.
- iv. Identification and benchmarking of R&D services of individual laboratories needs to be done on priority.
- v. Potential customers in targeted countries and the information about the competitors to be compiled for market positioning.
- vi. Strategic alliances or partnerships with sister laboratories or other institutions may be developed.