

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, which includes a chain of 27 research laboratories (21 permanent laboratories and 6 research centres) under Indian Council of Medical Research (ICMR). 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.

UNCTAD, in its World Investment Report 2005, has ranked India third after the US and China as a R&D hotspot, which it defines as 'a place where companies can tap into existing networks of scientific and technical expertise; which has good links to academic research facilities; and provides an environment where innovation is supported and easy to commercialize.'

India has 380 universities and 11,200 higher education institutions churning out around 6,000 PhDs and 200,000 engineers, 300,000 science graduates and post graduates annually. The R&D investment in India has grown at a CAGR (Compounded Annual Growth Rate) of 45% over 2002-04 and is likely to remain over 40% in the coming years. In India, about 85% of the R&D activities is still carried out by the Government through its research labs and public sector units. The present Indian research network under the government sector consists of laboratories under Council for Scientific & Industrial Research, Indian Council of Medical Research

(ICMR) and Indian Council of Agricultural Research (ICAR), Department of Biotechnology (DBT), Department of Space, Department of Atomic Energy, Ministry of Defence, etc. 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.

However, the focus on taking an idea to market needs to be stronger in India. The importance of commercializing R&D has to take place in Indian organizations from the conceptual stage to avoid time delays, cost overruns and reinventing the wheel. In India, the government research institutes and academic institutions have a large pool of IP assets and unless they network with Indian or multinational corporations, they will not be in a position to commercialize these assets. Global organizations have realized this and are making use of India's competitive advantage of a talented workforce and its expertise in certain sectors such as biotechnology and pharmaceutical. This has enabled them to enhance their success of new product introduction and its time to market.

Various initiatives are being taken by different sections of the R&D ecosystem. Contract Research centers in the pharmaceutical sector are helping global companies with their development of drugs in India. The government and private sectors are stressing on the need for cost effective products for society.

R&D in India is moving from advanced development of products and basic research to more advanced research that is pioneering in nature. To encourage such fundamental R&D, innovation networks between Indian companies, Indian research institutes and multinational corporations have begun to take shape. Many of the multinationals that have set up R&D centers in India such as Motorola, Intel, AstraZeneca, Eli Lilly, GE, General Motors etc. are focusing on R&D for the global market.

Objective of the Study

The objectives of the study were:

1. To examine the types of R&D services available from the ICMR system, laboratory-wise in different sectors and identify the exportable R&D services.
2. To study the availability of major facilities and equipments with ICMR laboratories for conducting R&D work.
3. To come out with the suggestions and recommendations to promote the export of R&D services from the ICMR system.

Methodology of the Study

A study team consisting of representatives from DSIR, ICMR and CITT- IIFT was constituted. A questionnaire was designed for the purpose of data collection. The questionnaire was sent to all the 21 permanent institutes and 6 Regional Medical Research Centers of ICMR. The manner in which R&D services can be delivered were categorized into 11 “delivery modes” viz. (i) training, (ii) testing, (iii) consultancy services, (iv) IPR services, (v) surveys, (vi) studies, (vii) clinical trials, (viii) contract / sponsored research, (ix) technology transfer, (x) supply of information and (xi) specialized services. 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 21 permanent institutes and 6 Regional Medical Research Centers of ICMR were grouped into following Six main functional groups:-

1. Communicable diseases
2. Reproductive Health and Nutrition
3. Non-Communicable diseases
4. Basic Medical Sciences
5. Environmental & Occupational Health
6. Medical Statistics

The data received through questionnaire and during personal discussions 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.

The analyzed data of individual laboratories under the 6 main groups, mentioned above are shown in chapters 4, 5, 6,7and 8 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.

Findings

1. There are 21 ICMR permanent institutes and 6 Regional Medical Research Centers who are involved in various R & D activities; however data could be obtained only from 19 institutes/centres (includes 15 permanent institutes and 4 Regional Medical Research Centers) out of the 27 institutes/centres approached.
2. The manpower employed in the core competencies by these 19 institutes/centres (includes 15 permanent institutes and 4 Regional Medical Research Centers), according to our survey, in terms of R&D personnel is 435 and supporting staff is 1257. The total manpower employed in various groups are: Communicable Diseases (1135), Reproductive Health and Nutrition (345),

Non-Communicable Diseases (91), Basic Medical Sciences (90), Environmental & Occupational Health (31) and Medical Statistical group (data not available).

3. The various exportable R&D services of 19 ICMR institutes/centres (includes 15 permanent institutes and 4 Regional Medical Research Centers) are: Testing, Training, Consultancy services, Surveys, Studies, Clinical Trials, Contract research and Supply of information/database.

4. The main core competencies of the various identified groups are:

Communicable Diseases Group: There are 13 laboratories in this group. The main core competencies identified in this group of labs are: Microbiology, Immunology, Molecular Biology, Epidemiology and Clinical Trials.

Reproductive Health and Nutrition Group: There are 3 laboratories in this group. The main areas of core competencies in this group are: Expanding Contraceptive choices, Infertility & Reproductive Disorders, Menopause & Osteoporosis, Reproductive Tract Infections, Maternal & Child Health, Adolescent Reproductive health, Division of Field Studies, Behavioral Sciences, Clinical Division, Endocrinology, Lipid Chemistry, FDTRC, PCT, Extension and Training.

Non-Communicable Diseases Group: There are 4 laboratories in this group. The main areas of core competencies in this group are: Field Epidemiology Training Programme (FETP), Research studies/surveys, Clinical trials, Consultancy in Epidemiology and Biostatistics.

Basic Medical Sciences Group: This group comprises of 3 laboratories. The main areas of core competencies in this group are: Histopathology, Molecular Biology, Immunology/Immunohistochemistry, Cell Biology / Tissue Culture / Hybridoma, Cytopathology, Hemoglobinopathies, Hemostasis.

Environmental & Occupational Health Group: The main areas of core competencies in this group are: Occupational Medicine research, Occupational Hygiene research, Psychology and Environmental assessment.

Medical Statistics: The competency of the institute is in doing research studies for data collection on important matters related to medical science.

5. The 19 ICMR labs (includes 15 permanent institutes and 4 Regional Medical Research Centers) have a total numbers of 13 accreditations, 16 certifications and 201 collaborations. These 19 laboratories have generated 13 patents as a whole in various groups.
6. Up to the year 2006, 19 ICMR labs (includes 15 permanent institutes and 4 Regional Medical Research Centers) had published 5391 papers in various groups. However, there is gradual increase in the number of papers published from the year 2000 to 2006.
7. The target markets identified by various 19 ICMR laboratories (includes 15 permanent institutes and 4 Regional Medical Research Centers) are: Third world countries, South- east- asian countries (like, Malaysia, Thailand, Singapore, Philippines), Middle- east countries, USA, Australia, Italy, China, Germany, Japan, UK, Canada, etc.

Constraints and suggestions given by ICMR labs

A few of the laboratories have expressed that they are encountering problems such as lack of market information, inadequate marketing capabilities, bureaucratic bottlenecks and lack of resources. However, most of the laboratories have indicated that they do not have information on national and international regulations especially with regard to export of R&D services.

The following suggestions have been given by some of the laboratories to overcome these difficulties/problems for enhancing export of R&D services, i.e. - collaboration with industries, single window clearance mechanism, availability of suitable resources, training and international exposure for the scientists and technical staff, up-gradation of laboratories, capacity building and manpower development, maintaining a system to support data bases.

Observations & Recommendations

1. There is potential to export R&D services from ICMR system in various areas of their core competence. However, they are lacking in information regarding business opportunities, inclination & orientation towards international marketing of R&D services.
2. In general, ICMR labs feel that there should be appropriate policy directive with regard export of R&D services.
3. Level of international exposure for marketing R&D services and global competition in most of the labs is inadequate.
4. Some of the laboratories under the ICMR system have taken initiatives to forge research partnerships with MNCs, which can be leveraged to provide R&D services in areas such as drugs and pharmaceuticals, etc.
5. ICMR 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.
6. ICMR should encourage adoption of 'corporate-culture' in its laboratories with adequate restructuring and retaining the research environment at the same time.

7. Regular orientation programs may be considered for young scientists as well as middle managers in ICMR labs to help them to tap the global health market.
8. A corporate strategy may include evolving an appropriate structure at the ICMR that would facilitate export of R&D services with active participation of laboratories.
9. Identification and benchmarking of R&D services of individual laboratories needs to be done on priority.
10. Potential clients in targeted countries and the information about the competitors to be compiled for market positioning.
11. Strategic alliances or partnerships with other laboratories or institutions may be developed.
12. Labs need a pro-active approach to identify specific markets for their R&D services and understand marketing.
13. The future areas in which skill development is required include Neuroscience, Oncology, Paediatrics, Women's health, Diabetes, Phage therapy, Tuberculosis, Alzheimer disease, Epilepsy, Transplantation, Hepatitis, HIV, Cardiology, Ophthalmology, Non-Hodgkin's Lymphoma, Psychiatry, Infectious diseases, Metabolic diseases (Osteoporosis) and Respiratory diseases (Asthma, Bronchitis).
14. ICMR also need to developed skills in international business and business implication from recent world trade rules including WTO, RTA, FTA, etc, participation in international exhibition / trade fairs related to the areas of

competence and developing a dynamic data base for R&D services need of other target countries.

15. A detailed mapping of R&D services capabilities and expert services in ICMR are another recommendation for future.

16. ICMR may also consider an engaging international business management institution for consulting and developing business strategies including partnerships and networks.