Executive Summary

Introduction:

India has been experiencing an increase in inflow of funds in the form of Foreign Direct Investment for research and development activities. Today, corporations in industries such as automobiles, electronics, biotechnology and pharmaceuticals are establishing research and development facilities in select developing countries in increasing numbers. Currently, only a few developing countries attract such activities on a significant scale. India is one of them. While more and more R&D centres are being established in India it would be interesting to study the objectives for establishing these centres, R&D being carried out in these centres, the benefit of these R&D centres to Indian economy & industry and the policy measures required to make these R&D centres as an integral part of Indian R&D system. With this in view, a study on the foreign R&D centres in India was taken up by Centre for International Trade in Technology of IIFT with the funding from Department of Scientific and Industrial Research, Ministry of Science and Technology, Government of India.

Objective of the study:

The objective of the present study is to study the activities of foreign owned R&D centres in India and examine their role in domestic R&D capacity building. In order to meet the objective of the study, the task can be split into two separate tasks, viz

(1) To study the characteristics of R&D activities of the selected foreign R&D centres.
(2) To find out whether each of these R&D centres are engaged in one or more activities that contribute to the capacity building of the related Indian industry.

Methodology:

Since the study was the first of its kind in India, a thorough literature survey was done to find out the various issues connected and what other advanced countries

have found out by such studies. The issues were then deliberated by the investigators and the suggestion of senior IIFT faculty members were incorporated in finalizing the questionnaire. This well designed questionnaire was then sent to 119 carefully selected foreign companies who have established R&D centres in India. These companies were identified with the help of List of Foreign collaborations Approvals, List of Fortune 500 companies, India Brand Equity Foundation, web sites of companies and related papers published by distinguished scientists and scholars.

The data received from the responding Foreign R&D centres was further augmented by the information available from the web sites of the centres. This augmented information was got vetted from the Foreign R&D Centres, analyzed and interpreted for the study.

Scope of the Study:

In this study of the foreign R&D centres in India, we have limited ourselves to the R&D centres established in India but with a foreign ownership and belonging to certain identified sectors. The sectors included are the following:-

1 Agriculture
2. Automobile
3. Bio-technology & Pharmaceuticals
4. Chemical
5. Computer Software & Hardware
6. Others (including electronic / mechanical)

Findings:

1. The sector-wise distribution of the identified companies to whom the questionnaire was sent was Agriculture (12), Automobile (12), Biotechnology & Pharmaceuticals (46), Chemical (17), Computer software & hardware (24), and Others - Electronics & Mechanical (8).

2. Out of the above 119 foreign companies, the information available for analysis was from 33 companies having 37 R&D centres in India. The sector-wise break-up was Agriculture (8), Automobile (4), Biotechnology & Pharmaceutical (16), Chemical (3), Computer Software & Hardware (4), and others (2) corresponding to 21%, 11%, 43.1%, 8.5%, 11% and 5.4 % respectively of the R&D centres approached in the select sectors.

3. In our sample, 5 foreign companies established their R&D centres in India till 1985. However, the number increased with the liberalization of policies and 5 more foreign companies established their R&D centres during 1994-1996. The number increased further during the period 1997-2004 in which 22 more foreign companies established their R&D centres and one foreign company established its R&D centre in 2005.

4. The main countries to which these companies belong are USA, UK, Canada, Japan and European Union. The R&D centres are mainly concentrated in Karnataka (15), Maharashtra (13), Andhra Pradesh (5) Delhi/NCR (2), Goa (1), Gujarat (1). The main cities are Bangalore, Hyderabad, Delhi (NCR), Mumbai, Pune and Aurangabad. The companies from above mentioned countries are also establishing their R&D Centres in other developing countries like China, Brazil, Korea, Taiwan, New Mexico, Singapore & Malaysia etc. The number of R&D centres established by a particular company in a country also varied.

5. In our sample, the most common reason highlighted by the respondents for establishing R&D centres in India was availability of skilled Manpower (75.8%), followed by Proximity to Indian market (67%), existing S&T infrastructure (36.4%) and government's conducive policies (21.2%).

6. The Biotech and pharmaceutical R&D centres also cited well established corporate infrastructure, growth in health & insurance sector, English speaking investigators and huge literate patient base with commercially significant diseases along with heterogeneous population mix, good patient

compliance and less expensive clinical trials as the reasons for choosing India as the destination of their foreign R&D centres.

7. The companies in Agriculture & Automobile field are mainly attracted towards India due to availability of skilled manpower and proximity to Indian market where as foreign Chemical R&D company's attraction is Indian market.

Summary of findings of the locational and research characteristics for all sectors combined

PARTICULARS	CHARACTERISTICS
Number of centres contacted	119
Number of centres data available for	37
Locations	Bangalore (16), Mumbai (8), Hyderabad (4), NCR (2), Pune (2), Aurangabad (2), Vadodara (1), Goa (1), Karnool(1)
Country of origin	USA (17), Switzerland (3), Germany (2), UK (2), Japan (2), Croatia (1), Denmark (1), Holland (1), Saudi Arabia (1), France (1), Netherlands (1), Sweden (1)
Primary Reasons for choosing India as a destination	1. Availability of skilled manpower 2. Proximity to Indian Market 3. Availing existing S&T infrastructure 4. Conducive government policy 5. Availability of mass of diseased yet literate people for clinical research 6. political stability
Primary Objective of the R&D centres	1. Support R&D activities of the parent organisation 2. support manufacturing activities of the parent organisation 3. Contract research for organisations world wide 4. Contract research for organisations in India 5. Consulting

Benefits to India:

1. Employment benefit:

India is being benefited from these foreign R&D centres in terms of employment as sizable number of Ph.Ds, Master and Bachelor degree holders in Science & engineers, technicians etc are working on future technologies under generation, working with sophisticated equipment / machinery and getting opportunities for

specialized training abroad etc. The 37 R&D centres of 33 firms have employed 4656 persons in their R&D Centres.

2. Contribution to capacity building:

The R&D organizations in India and the universities as well as the industry is also gaining by working with these foreign R&D centres through contract research, collaborative research, training programmes & courses being conducted by some of them. Some of the R&D centres have established linkages with a few government departments like DBT, DSIR, national laboratories, Universities, IITs, management institutes and organizations like National Research Centre for Sorghum (NRCS), International Crop Research Institute for Semi-Arid Tropics (ICRISAT) etc. The sector- wise analysis of the activities which contribute to the national capacity building based on our sample is given below:

a. Contract Research for Industry

In the Biotechnology & Pharmaceutical Sector 8 out of the 15 firms are engaged in contract research. The corresponding numbers in the Computer Software & Hardware Sector is 2 out of the 4 firms. Firms in all other sectors do not engage in such activities.

b. Collaborative Research with Universities & Industry

Contribution to capacity building through this mode in the Biotechnology & Pharmaceutical Sector is done by 2 firms out of the 15 firms. The corresponding numbers in the Agriculture Sector is 2 out of the 5 firms and in Computer Software & Hardware Sector the numbers is 1 out of the 4 firms.

c. Training Programmes for Employees for Skill Development

The contribution to national capacity building through trainings and skill development in the foreign R&D centres studied who provide training programs to their employees is given below sector-wise:-

Agriculture Sector	:	14
Automobile Sector	:	01
Biotechnology & Pharmaceutical Sector	:	12
Chemical Sector	:	05
Computer Software & Hardware Sector	:	20

A total number of 52 training programmes have been conducted by the 37 R&D centres of 33 firms.

d. R&D to support manufacturing unit in India

The number of firms supporting manufacturing units in India, sector-wise are given below:-

Agricultural	:	5 (out of 5) firms
Automobile	:	3 (out of 4) firms
Biotechnology & pharmaceutical	:	9 (out of 15) firms
Chemical	:	3 (out of 3) firms
Computer software & hardware	:	3 (out of 4) firms
Others	:	2 (out of 2) firms

e. Other Activities

A few of these centres are also working as international certification bodies in India and are conducting lead Auditor courses like HACCP for DNV, for ISO:14000/9000 and Six Sigma Management at IIT, Mumbai. Besides a few of them also offer scholarship programmes in leading institutes to students pursuing graduation, post-graduation in engineering sciences and management courses.

The following summary table shows sector-wise the Technologies developed, Manpower employed, Training programmes conducted, R&D expenditure incurred and Patents generated by foreign R&D centre studied.

Summary Table:

Sectors	Technologies Developed	Manpower Employed	Training Programmes	R&D Exp (Rs. in Lakhs) (during 2002-2005)	Patents
Agriculture	23	117	14	1116	3
Automobile	8	NA	1	NA	NA
Biotech	69	2274	12	NA	216
Chemical	35	900	5	NA	380
Computer Software & H/W	11	1339	20	450	345
Others	33	26	NA	262	NA
Total	**179**	**4656**	**52**	**1,828**	**944**

Benefits to Parents Companies:

The study shows that the foreign R&D centres in India are supporting their parent's manufacturing units. The number of firms supporting their parent's manufacturing/R&D activities in each sector is given below:

Agriculture Sector	:	3 out of 5 firms
Automobile Sector	:	2 out of 4 firms
Biotechnology & Pharmaceutical Sector	:	10 out of 15 firms
Chemical Sector	:	2 out of 3 firms
Computer Software & Hardware Sector	:	1 out of 4 firms
Others	:	1 out of 2 firms

Observations & Recommendations:

Some of the foreign R&D centres have expressed that they are encountering difficulties such as lack of civic infrastructure, lack of people trained to do computer science and networking research. Customs clearance is a major difficulty for many pharmaceutical and biotechnology sector firms; this is especially a problem in case the R&D centre is working on micro-organisms. These operational problems require suitable policy measures.

Some of the observations from the literature surveyed and the information gathered during the study are:

1. There are about 200 foreign companies who have R & D Centres in India; however we could obtain data from 37 centres out of the 119 approached.

2. The total planned foreign investment in R&D is estimated at $ 27.5 billion by 2010 and actual inflow in year 2005 is $ 8.5 billion. However, the expenditure in 5 R&D centres out of 37 centres of 33 firms as reported by them is Rs.1, 828 Lakhs or $ 40.62 Lakhs during the last 3 years.

3. The manpower employed by these 37 foreign R&D Centres of 33 firms, according to our survey is 4656. However the total manpower employed by the foreign R&D centres in India has been reported as 22980[1]* in the available literature.

4. The total numbers of 944 patents have been generated by the 6 respondent R&D centres in various sectors (Agricultural -1, Biotechnology & Pharmaceutical -2, Chemical-1 and Computer Hardware& Software-2) out of 37 centres of 33 firms.

5. A total number of 179 technologies have been developed by the 27 respondent R&D centres out of 37 centres of 33 firms.

6. Foreign R&D centres are generally engaged in research for their own manufacturing units, in India and abroad.

7. Their contribution in the capacity building of the country through collaborations with academic institutions and universities, contract research & collaborative research studies with Indian industry are not many in number.

8. The diffusion of technologies has been highly limited.

[1]* Source: FDI in R&D sector: A study by Academy of Business Studies, New Delhi, prepared for TIFAC

9. There is no database or an organised system available in the country for interfacing or dealing with activities of Foreign R&D centres in India. Therefore suitable database, research and analysis facility and a pro-active action from Indian side needs to be set up.

10. The future areas in which skill development is required by these centres include Neuroscience, Oncology, Women's health, Diabetes, Phage therapy, Alzheimer disease, Transplantation, Hepatitis, HIV and Cardiology in Biotechnology & Pharmaceuticals; Plant breeding, Germ Plasm development and Crop genetics in agriculture; Polymer research in chemicals; e-commerce, clinical research related and network management software's etc.

11. For wider diffusion of skill spill over capabilities and more collaborative arrangements with domestic institutions / industry, special incentives or mechanisms need to be evolved. Greater interaction among foreign R&D centres and domestic industries may be encouraged.