# Chapter 1

## Background

### 1.0 Introduction

The share of 'Services' is increasing at a very rapid rate in the national Gross Domestic Product all over the developed world as well as in some developing countries including India. In India, the share of services now accounts for more than 50% of the combined share of agriculture and manufacturing sectors to the GDP. The services sector will continue to play an increasingly significant role in India's economic development. While India's share in global merchandise trade is around 0.8 per cent, the share of Indian services exports is slightly higher at 1.3 per cent of the total world trade in services.

However the services offered by countries, differ according to their patterns of national competitive advantage. For example, Swiss firms are strong in banking, logistical services, training etc. whereas Singaporean firms are strong in ship repair, port and terminal services.

India has enviable R&D infrastructure and technological capabilities in some sectors, supported by highly trained and qualified manpower, well equipped R&D laboratories and systems including a chain of 38 research laboratories under the Council of Scientific & Industrial Research. These laboratories are known to be equipped with internationally comparable facilities and the experts in certain areas are capable of providing R&D services as well as carrying out R&D activities. Thus India is in the position to offer its R&D services to the world for mutual benefits.

## 1.1 Objectives and scope of the study

The study "Exportable R&D services from CSIR System" was undertaken with the following in view:-

I. To examine the areas of expertise in which 38 CSIR laboratories are capable of providing R&D services
II. To find out from the survey of 38 laboratories of CSIR, their potential to export R&D services:
III. To find out the constraints being faced by CSIR laboratories in exporting R&D services.

To fulfill the above objectives a conceptual model for marketing of R&D services was developed so as to compare the CSIR labs with this model and study the deviations.

## 1.2 Development of Conceptual model

The conceptual model assumes that any good laboratory would posses assets such as infrastructure with latest equipment and machinery, number of quality scientists, availability of support personnel etc. to support the scientists in their research work and enable them to achieve their targeted goals and produce quality work in the form of papers, patents and processes that make the laboratory known to the prospective industry and enriches the areas of their core competencies.

## 1.3 Conceptual Model for Marketing of R&D Services

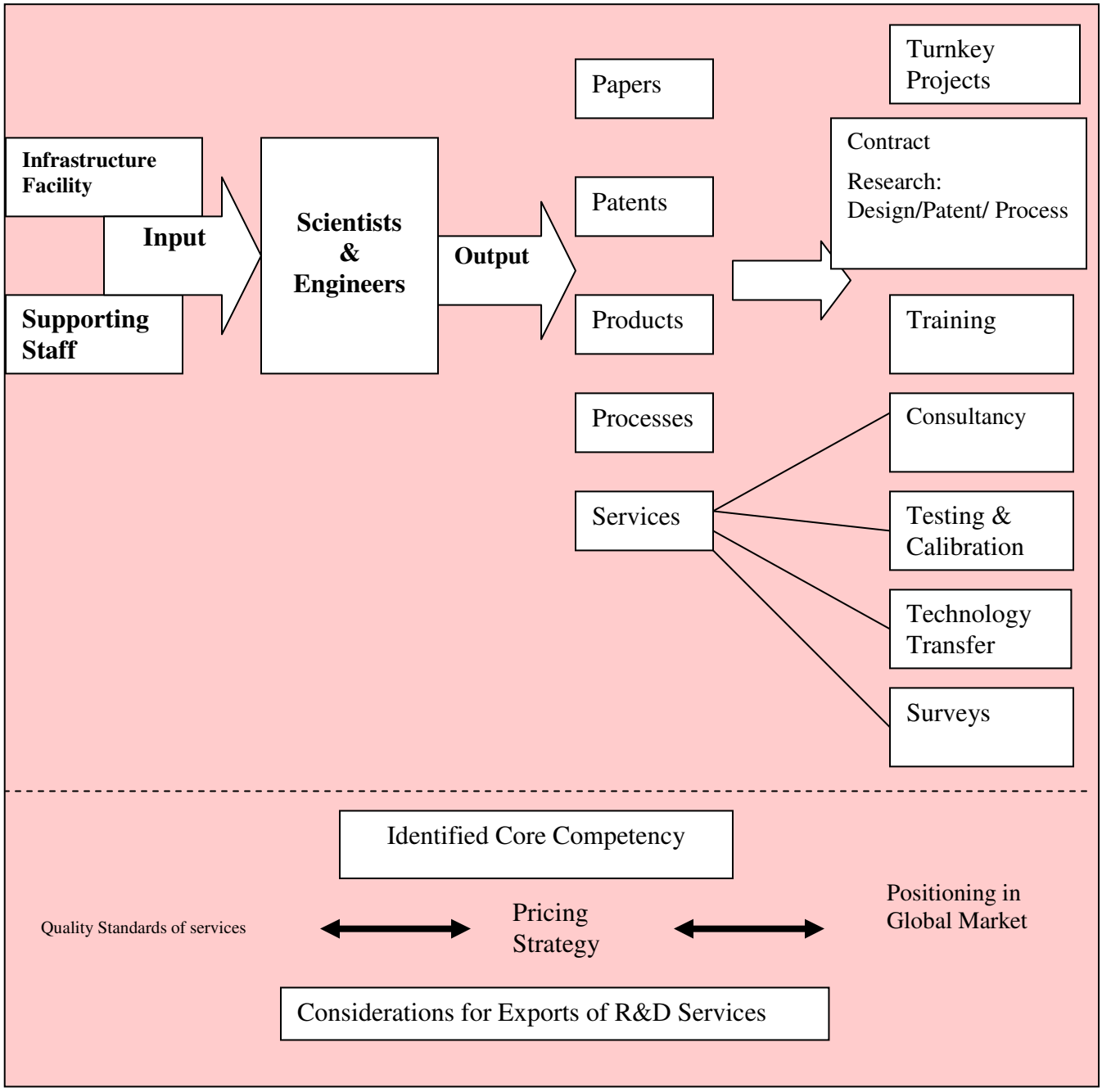
It was envisaged that the scientist and engineers are at the core of the scientific & technical expertise, the laboratories are known for. In an input-output model, the infrastructural facilities comprising of buildings, equipment, working space, workshops, library and other miscellaneous office and technical facilities and the supporting staff constitute the input side. The output is in the form of research papers, patents, products, processes and technical services. Input and output

together constitute the core competence of the laboratory or its division specializing in different areas of study and research. The services emanating from the laboratory are dependent on the strength of its core competencies and can take the form of training, consultancy, testing and calibration, technology transfer and IPR services, surveys, contract research and even turn key projects. Therefore, identification of core competencies becomes important to plan any strategy for marketing of R&D services. From marketing point of view, while quality and standards of services are critically dependent on the strengths of core competencies, the pricing strategy and market positioning depends on quality and standard of services, targeted countries and the competitors.

The above concept is depicted pictorially in Figure 1-1.

**Figure 1-1**

**Conceptual model for marketing of R&D services**



## 1.4 Methodology

A study team consisting of representatives one each from DSIR, CSIR and two from CITT- IIFT was constituted. This team designed a well thought of questionnaire (Annexure 6), which was sent to all the 38 laboratories of CSIR to obtain feedback. The manner in which services can be delivered were categorized into 8 devilry 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 (vii) 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 supply the information under the above identified heads / sub-heads against 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 were also invited to give their suggestions to overcome the constraints. The study team also had personal interactions with scientists of various laboratories besides visiting selected laboratories.

The preliminary data obtained from the laboratories was scrutinized by the study team and clarifications / specific data depending upon the nature of the work of individual laboratory were sought.

The data obtained was compiled, classified and tabulated according to the objectives of the study. The analysis of the data was carried out as per the information supplied by the laboratories about the R&D services offered by them in India or abroad.

The Study Team comprised of Dr. Rajendra Prasad, Joint Advisor, CSIR; Mr. Ashwani Gupta, Director, DSIR; Mr. Rajeshwar Dayal, Consultant – CITT, IIFT and Mrs. Jasmine Acharya, Research Fellow, CITT- IIFT.

## 1.5 Services under GATS

Services are divided into following 12 sectors in the WTO General Agreement on Trade in Services (GATS):

1. Business services
2. Construction and engineering services
3. Environmental services
4. Health services
5. Energy services
6. Communication services
7. Educational services
8. Financial services
9. Transport services
10. Distribution services
11. Tourism services
12. Movement of natural persons

R&D Services enlisted in GATS constitute a part of business services which are defined as those that provide intermediary impacts throughout the value chain. They include activities such as computing, consultancy services, research and development services, marketing and advertising (including market research), management consulting, rental leasing services without operator, technical testing and analysis and maintenance and repair of equipment services etc.

R&D services are further sub-divided into

- R&D services in Natural sciences
- R&D services in Social sciences and Humanities
- Interdisciplinary R&D services

**1.6 Mode of supply of services under GATS**

For providing the services by a member country to another member country following are the four modes:

**1) Cross-border supply -** refers to a situation where the service flows from the territory of one Member country into the territory of another Member country. For example, an architect can send his architectural plan through electronic means; a teacher can send teaching material to students in any other country; a doctor

sitting in Germany can advise his patient in India through electronic means. In all these cases, trade in services takes place and this is equivalent to cross-border movement of goods.

**2) Consumption abroad** – refers to a situation where consumer of services moves into the territory of another Member country to obtain the service. For example, a tourist using hotel or restaurant services abroad; a ship or aircraft undergoing repair or maintenance services abroad.

**3) Commercial presence** – implies that service suppliers of a Member country establish a territorial presence (a legal presence) in another Member country with a view to providing their services. In this case, the service supplier establishes a legal presence in the form of a joint venture / subsidiary / representative / branch office in the host country and starts supplying services.

**4) Presence of natural persons** – (this only refers to export of manpower) covers situations in which a service is delivered through persons of a Members country temporarily entering the territory of another Member country. (e.g. doctors, engineers, individual consultants, accountants, etc.)

GATS cover only temporary movement and not citizenship, residence or employment on a permanent basis in the foreign country.

It is not uncommon to see combination of two or more or sometimes all of them in order to provide the required service.

### 1.7 Commitments for R&D services under GATS

Presently, only some countries have committed for a few sectors of R&D Services. India is a signatory to only the R&D services in natural sciences. Our commitment in this sector covers heat, light, electromagnetism, astronomy, engineering and technology including applied science and technology for casting, metal, machinery, electricity, communication, vessels, aircraft, civil engineering, construction, information etc. It excludes atomic energy related matters.

Several other countries have made commitments of varying nature. For example: Australia, Brazil, EU, Indonesia, Japan, Korea, Kuwait, Thailand and the US have not made any commitments in cross-border category and many of them have not undertaken commitments in this sector due to the reason of technical

infeasibility. Only a few countries, such as Argentina, Canada, Norway and United Arab Emirates have undertaken commitments to fully liberalise trade through this mode.

In the Consumption abroad category Antigua & Barbuda, Bulgaria, EU, Gambia, Hungary, Iceland, Jamaica, Liechtenstein, Mexico, Pakistan, Slovenia, Swaziland, Switzerland, Trinidad & Tobago, United Emirates and Venezuela have no limitations on market access or national treatment in R&D services in natural sciences.

In the Commercial presence category, which involves the establishments of R&D labs, institutions, centre of excellence etc., Bulgaria, Dominican Rep., Gambia, Hungary, Kuwait, Liechtenstein, Nicaragua, Pakistan, Qatar, Slovenia, Swaziland, Switzerland, Trinidad & Tobago and United Arab Emirates and Venezuela have not mentioned any limitations on market access or national treatment in R&D services in natural sciences.

Antigua & Barbuda, Swaziland and Trinidad & Tobago have also not put any limitations on market access or national treatment in R&D services in natural sciences.

### 1.8 R&D Services Scenario in World Market

The total investment on R&D in the world during 1980 was of the order of US $ 208.4 billion. This increased to US $ 271.9 billion in 1985, US $ 452.6 billion in 1990 and further to US & 677 billion in 2002. One of the most commonly used indicators for international comparison of science and technology (S&T) efforts, is the proportion of GDP devoted to R&D activities. The expenditure on R&D as percentage of GDP for the whole world in 1990 was 2.55 %. For the developed countries, it has gone up from 2.22% in 1980 to 2.62 % in 1985 and further to 2.92 % in 1990 where as in case of developing countries the percentages for these three years were 0.52 %, 0.54 %, and 0.64 % respectively. India spent 0.81 % of GDP during 1998-99 and currently spends around 1.0%.

The estimates for total world market for R&D services are not readily available. However, it is expected to be quite large. For example, Canada alone imports R&D services worth about $ 1 billion.

### a. Trends in R&D expenditure:

In the absence of the estimates for total world market for R&D services the indicators like R&D share of the GDP can be used to find the trend in the growth of R&D of a particular country. In the year 2001, OECD countries allocated about USD 645 billion to R&D which amounts to about 2.3 % of overall GDP. In the OECD-area R&D expenditure has continued to increase steadily in recent years, rising by 4.7% annually between 1995 and 2001. From 1995 onwards the growth in the United States (5.4% per year) has out paste growth in European Union (3.7%) and Japan (2.8%). The R&D expenditure in US accounted for approximately 44% of the OECD total which is approximately equal to the total of European Union (28%) and Japan (17%). The lower growth in R&D expenditure in the E.U. is mainly attributed to the slow and declining growth in the major European countries. As compared to the average growth in the OECD area during 1995-2001 (4.7%), R&D expenditure increased by only 3.2 % per year in Germany and by less than 3% in France, Italy and U.K. Sweden, Finland, Japan and Iceland are the only four OECD countries in which the ratio of R&D to GDP exceeded 3% which is well above the OECD average of 2.3%. Table 1-1 below shows the gross domestic expenditure on R&D (GERD) as a percentage of GDP in some selected countries from 1991 to 2002.

**Table 1-1**

**GDP share of R&D expenditure in selected OECD countries in 1991-2002**

| Country | 1991 | 1993 | 1995 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|
| Austria | 1.47 | 1.47 | 1.56 | 1.71 | 1.79 | 1.85 | 1.84 | 1.90 | 1.94 |
| Belgium | 1.62 | 1.70 | 1.72 | 1.87 | 1.90 | 1.96 | . | . | . |
| Canada | 1.60 | 1.70 | 1.72 | 1.71 | 1.79 | 1.81 | 1.87 | 1.94 | 1.85 |
| Czech Republic | 2.02 | 1.21 | 1.01 | 1.16 | 1.24 | 1.24 | 1.33 | 1.30 | . |
| Denmark | 1.64 | 1.74 | 1.84 | 1.94 | 2.06 | 2.19 | 2.31 | 2.43 | . |
| **Finland** | **2.04** | **2.16** | **2.28** | **2.71** | **2.88** | **3.23** | **3.40** | **3.42** | **3.46** |
| France | 2.37 | 2.40 | 2.31 | 2.22 | 2.17 | 2.18 | 2.18 | 2.20 | . |
| Germany | 2.53 | 2.35 | 2.26 | 2.29 | 2.31 | 2.44 | 2.49 | 2.49 | 2.50 |
| Hungary | 1.06 | 0.97 | 0.73 | 0.72 | 0.68 | 0.69 | 0.80 | 0.95 | . |
| Iceland | 1.18 | 1.36 | 1.57 | 1.88 | 2.07 | 2.39 | 2.77 | 3.06 | 3.04 |
| Ireland | 0.93 | 1.17 | 1.28 | 1.29 | 1.25 | 1.22 | 1.15 | 1.17 | . |
| taly | 1.23 | 1.13 | 1.00 | 1.05 | 1.07 | 1.04 | 1.07 | . | . |
| Japan | 2.93 | 2.82 | 2.89 | 2.83 | 2.94 | 2.94 | 2.98 | 3.09 | . |
| Netherlands | 1.97 | 1.93 | 1.99 | 2.04 | 1.94 | 2.02 | 1.94 | . | . |
| Norway | 1.64 | 1.72 | 1.70 | 1.64 | . | 1.65 | . | 1.62 | . |
| Poland | . | . | 0.69 | 0.71 | 0.72 | 0.75 | 0.70 | 0.67 | . |
| Portugal | . | . | 0.57 | 0.62 | 0.69 | 0.75 | 0.79 | 0.83 | 0.78 |
| South Korea | 1.92 | 2.22 | 2.50 | 2.69 | 2.55 | 2.47 | 2.65 | 2.96 | . |
| Spain | 0.84 | 0.88 | 0.81 | 0.82 | 0.89 | 0.88 | 0.94 | 0.96 | . |
| Sweden | 2.70 | 3.27 | 3.46 | 3.67 | . | 3.78 | . | 4.28 | . |
| United Kingdom | 2.07 | 2.05 | 1.95 | 1.81 | 1.80 | 1.88 | 1.85 | 1.90 | . |
| United States | 2.72 | 2.52 | 2.51 | 2.58 | 2.60 | 2.65 | 2.72 | 2.82 | 2.82 |
| **OECD total** | **2.23** | **2.14** | **2.10** | **2.15** | **2.17** | **2.20** | **2.25** | **2.33** | **.** |

Some data preliminary or estimates

**Source:** OECD, Main Science and Technology Indicators 2003/1; national statistical offices

## b. Trends in global outsourcing

There is an increasing pressure on shortening international market penetration times for new products, on shortening R&D times, and on decreasing the market life times for new products. Innovations are beginning to have multiple geographical and organisational sources of technology with increasingly differentiated and innovation specific patterns of diffusion. R&D in high-technology industries such as biotechnology, microelectronics, pharmaceuticals, information technology and new materials has become highly science based. The costs of doing R&D are also increasing phenomenally. The high technology goods have doubled their share of world merchandise in the last twenty years while at the same time dropping the share of primary products by half. More than half of the GDP in major OECD countries is attributed to the production and distribution of knowledge.

There has been a progressive weakening of the strategic position of corporate central laboratories within large firms. The firms around the world are becoming very selective with internal developments focused on critical products and processes. They complement their internal efforts with external technology acquisition on a global basis.

Creation of seamless laboratories around the world is also being helped by the evolution of global information networks. Indeed, these networks are allowing the real-time management and operation of laboratories in any part of the world. Thus, companies are gaining a competitive advantage by using the global knowledge resource and working with a global time clock. The trend is also being fuelled by the shortage of R&D personnel in some emerging high technology areas in industrialized countries. The companies have to bridge that demand-supply gap in skills by external outsourcing. Obtaining access to high-quality scientists, engineers and designers is on the top of the agenda of many major companies now.

## 1.9 R&D Services Scenario in India

In India, in the year 1998-99, about 55 % of the total expenditure was accounted for only three objectives – defence, space and development of agriculture, forestry & fishing. The share of basic research was 17.6%, applied research 39.9%, experimental development 33.3% and the related supporting activities was 9.2%.

Central government including public sector, accounted for 67.5 % of the total national R&D expenditure during 1998-99. Majority of total expenditure was done by five major scientific agencies viz. DRDO, DOS, ICAR, DAE, and CSIR who put together accounted for 86 % of the total R&D expenditure.

Scientific and technical manpower is one of the major input resources for scientific and technological activities and is also an indirect measurement of the development stage of any country. India is fortunate in having this vital resource available in plenty. As per the government estimates, 3.08 lakh personnel were employed in R&D establishments as on April 1, 1998. About 77 % of them were employed by the institutional sector and 23 % by the industrial sector. According to the nature of work, out of the total, 30.9 % of the personnel were engaged primarily in R&D work, 32.7 % were performing auxiliary activities (technical support) and 36.4 % were doing administrative and other non-technical activities. Considering that those directly engaged in R&D activities and those extending technical support are by and large qualified in science and technology (S&T), it may be estimated that 1.96 lakh S&T personnel were deployed in R&D sector as on April 1998, which is just 2.9 % of the total estimated stock of S&T personnel for the year 1998. This also reflects that the average number of auxiliary personnel per R&D person was 1.05, varying from 0.78 to 2.20 in the institutional sectors compared to 0.69 and 0.58 in public and private sectors respectively. The number of administrative personnel per R&D personnel varied from 0.90 to 2.19 in the institutional sector and the same for public and private sector was 0.39 and 0.38 respectively.

The number of parameters like patents sealed, products developed, processes developed, import substitutes developed, design prototypes developed and consultancy services rendered by R&D institutions in different sectors are also indicators of a country's technological capabilities. WIPO patent statistics show that the Council of Scientific and Industrial Research (CSIR), one of the main organisations in India which is engaged in the promotion and development of science and technology has been the most notable performer among the major PCT applicants from the developing countries sharing first rank with Samsung Electronics Co. Ltd., Republic of Korea with 184 PCT applications during the year 2002. It is also a fact that in most of the above parameters, industrial sector has the major share except in case of consultancy services, inspite of the fact that majority of the investment goes into the institutional sector. This clearly shows that the institutional sector has not been able to be productive to the extent it should be and there is a need to redefine the objectives and strategies to be followed by the institutional sector.

The demographic shift in the western world means that a country like India with its relatively favourable demographic profile with a large proportion of working and talented young people can become a global innovation hub, from which not only outsourcing of innovation will be done, but in which R&D based innovation centers will be set up by the western companies. Indian advantage will not just be cost – but cost-cum-competence, considering the huge talent pool. A German software company set up in Bangalore recently showed that the ideas generated per employee were on an average three and a half times higher in their outfits elsewhere in the world!

Some of the leading national laboratories including those under the CSIR system, have already taken initiatives to supply their R&D services abroad, in areas of their strengths 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 Beecham with IICT are just a few examples of such partnerships. Recently, General Motors, Daimler Chrysler and Procter & Gamble have also

joined hands with CSIR institutions. Some of the computer software companies are also increasingly providing new higher and technological solutions and R&D support to their foreign customers, besides companies in drugs and pharmaceuticals and other sectors. Establishment and export of R&D, design and engineering services in the automotive sector is a relatively recent phenomenon in the industrial sector. Further, many of the well known names in the corporate sector including those in the Fortune 500 companies - including Delphi, Eli Lilly, General Electric, Hewlett Packard, DaimlerChrysler and others - have put up R&D facilities in India over the past five years. GE's John F Welch Technology Center in Bangalore is the company's largest such facility outside the United States. With an investment of US$60 million, it employs 1,600 researchers and plans to raise the number of staff to 2,400. GE Plastics has a 300-member research team in India. GE Motors India has developed an almost noiseless motor for GE's most sophisticated washing machines and is the soul sourcing point of millions of motors every year. The DaimlerChrysler Research Center in Bangalore is engaged in fundamental and applied research in avionics, simulation and software development as part of the corporate activities or stand alone, independently or in partnership with Indian institutes/laboratories or companies in sectors such as computer software, drugs & pharmaceuticals, automotives, engineering & design, etc. Recent announcement of Suzuki of Japan that they would set up their global R&D Centre for small cars and some components in India is an example of this kind.

In pharmaceuticals, Ranbaxy, Dr. Reddy's Labs and Sun Pharma, among others are the Indian majors that are investing heavily in R&D. Biotechnology is also heating up; Reliance Life Sciences is already recognized by the US National Institute of Health for stem-cell research. Reasonable cost structure and available of qualified research manpower have helped India emerge as the global R&D hub.

India currently is giving Europe tough competition as a growing pharma R&D hub. The latest Ernst and Young study has identified India as an emerging hub for collaborative and outsourced R&D in drug development, biotechnology

and chemicals. The report follows a European Commission communication that called for increased cooperation between the European Union and India in various fields, including biotechnology. "The EU is the world's second-largest center of biotechnology research activity after the USA. Indian biotechnology has been advancing rapidly in the past few years. Its next challenge is to successfully integrate the Indian biotechnology industry into the global biotechnology innovation system," noted the EC report.

Indian pharma companies are going for alternative business models to draw on competition and opportunity. They have shifted from business-driven research to research-driven business. So much so, in fact, that Indian pharma companies topped drug filings with the US Food and Drug Administration (FDA) in 2003, having filed a total of 126 Drug Master Files, accounting for 20% of all drugs coming into the US market, higher than Spain, Italy, Israel and China. Of the 108 abbreviated new drug applications pending approval from the FDA in February, as many as 52 were patent challenges, and nearly half of these were for first-to-file (180 day market exclusivity) applications.

India's biotech sector itself is expected to generate $5 billion in revenues and create over a million jobs in the next five years, according to Ernst & Young's 2004 "Progressions" report. As the companies focus on accelerating productivity, collaboration is the way forward for several US and European companies faced with a resource crunch. With its abundant high quality/low cost technical manpower, India is emerging as a partner of choice.

The emergence of Indian pharma giants, taking an active place in global R&D fields, has also helped. Indian companies have developed manufacturing processes for eight of the world's top 10 blockbuster drugs.

Also, some of the Indian companies are setting up their R&D joint ventures / subsidiaries / partnerships abroad. For example Ranbaxy's acquisition of RPG Aventis' French business; Wockhardt's acquisition of CP Pharmaceuticals in the UK; and Zydus Cadila's acquisition of Alpharma in France - all of which have catapulted these Indian companies into the global league.

There was a lot of inbound investment as well. Multinationals like Roche, Bayer, Aventis and Chiron have made India their regional hub for advanced pharmaceutical ingredients and bulk supplies. Clinical research outsourcing is seeing fast growth too. Pfizer doubled its R&D spending in India to around $13 million. Others such as Novartis, Astra Zeneca, Eli Lilly and GlaxoSmithKline have also committed to making India a global hub for their clinical research activities.

Less high-profile but more significant may be the mushrooming of new companies to do contract R&D for global ones. Divi's Labs, Vimta Labs and Matrix Labs are some new stars in this firmament. These are some of the examples to show the large business potential for R&D services for India.

The annual exports of technology and other services from India are expected to increase from USD 2 billion in 2003 to USD 24 billion in 2008, according to the New York-based market analysis McKinley and company.

### 1.10 Marketing Strategies & Business Potential

While formulating strategies at the macro level, relative competitiveness and relative wealth position of the country is to be kept in mind. Though, India is strong on relative competitiveness, it is low on relative wealth position. In order to realize our potential in world economy, a world-scale domestic market and world-class competitors are necessary to be developed simultaneously. Therefore the imperative for Indian R&D organizations would be to achieve world-class competitiveness and provide world-class services to the domestic market. A service organization can become successful in global market place only if it has established itself in the domestic market. As far as domestic market is concerned, CSIR laboratories have contributed a lot in India’s industrial development especially in the field of drugs & pharmaceuticals, chemicals & pesticides, leather, food especially in post harvest technologies, mechanical engineering items etc.

R&D services unlike most 'pure' services, is a tangible dominant service, where there is a definite tangible component in the overall product package. The results/products/processes have to be shown to the customers and have to conform to definite specifications, as is the case with pure products. The services are to be provided usually by a scientific body or institution(s) who may have a number of subordinate or associated laboratories and research centers; where the services are developed. The physical location of these institutions also plays a major role in creating an impression in the mind of the customers since in most of the cases the customers have to go to the laboratories or bring the samples for getting the job done. The CSIR laboratories are strategically located all over the country and have easy approach.

### 1.11 Strategies for Marketing of R&D Services

R&D services are high on both people as well as equipment. Although it is people who do the research and develop the new techniques / methods / products, they very heavily rely on technology and equipments for the development as well as delivery of services. The R&D services cover a wide range of activities and vary in nature, depending upon the requirements and capabilities. The technology transfer companies, technology incubators and technology parks, etc. are additional effective mechanisms to promote marketing of R&D services besides the research organizations themselves.

The experience of current successes by our R&D organizations shows a very strong correlation between the success achieved in fulfilling the domestic needs by quality services and the success at the international level. Once an organization is able to satisfy domestic needs successfully and is able to provide quality service to its domestic customers, it automatically becomes known in the global market place. Therefore, it is imperative for our R&D organizations to become world class in their own field and fulfill the domestic demands satisfactorily and simultaneously foraying into the global market place.

R&D laboratories falling in each of the above category need to clearly demarcate their potential customers, competitors and markets and accordingly frame the organization specific strategies.

Most of the Indian organizations utilize the first or second category in the first two categories Indian organizations are generally very price-competitive as compared to other developed and developing countries. There is a need to selectively operate under the third category since it will enhance our capabilities and competitiveness.

However, what is important here is to assess the extent to which the services offered by us are price elastic along with quality and established competence, in the global market place. We have advantage in terms of cost but we need to look at it from the customer's point of view. The time delay and other 'irritations', which might be caused due to red-tapism in our organizations or other reasons might be nullifying whatever advantage we have due to cheap knowledge workers.

Marketing strategy has to be unique in itself as it is organization and situation specific. However, general marketing strategy for R&D services is outlined below:

- There is a need to uniquely position our R&D service providers in the minds of the target customers.
- The organizations need to create an ambience within their facilities, projecting a high level of professionalism.
- There is need to continuously focus on developing products and technologies, which have greater applications for the industry. This will help not only in generating positive image about the organization but also in enlarging the client-base.
- The organizations should not just market to external customers but to their own scientists and researchers also so as to develop marketing culture in the organization.
- The strategic marketing plans for the organization(s) need to be developed keeping in the following basic points in minds:

- What business are we in, and what are the organizational mission and overall objective?
- Who are our customers and what benefits do they seek? How can we build or defend our competitive position?
- How should we offer new service that help / strengthen our competitive position?

A service organization can become successful in global markets only if it has established itself in the domestic market. Fortunately in our country a huge untapped domestic market exists, but there is a need to develop short term and long term business strategies for R&D services from India.

In the years to come, when services are going to be an important determinant of a country's position in the global market place, our R&D organizations need to prepare themselves and capture as much share as they can and need to develop a comprehensive concept about the services they can offer and also how they can utilize the R&D-Marketing interface to become successful in the market place