



INDIA
FASTEST GROWING
FREE MARKET DEMOCRACY



Discoveries to Dividends

Leveraging India's Cost-Effective Innovation Resources

**Prospectus
August 2008**



AMPLIFY INNOVATION WITH INDIA

Companies are amplifying their innovation capacities with external resources to improve competitiveness and efficiency. India, with its vast R&D infrastructure and cost-effective talent, is increasingly supplying these external resources. In the past five years, more than 200 U.S. firms have established R&D operations in India.

How do you get a piece of India's innovation pie? Is Indian R&D worth your time? India's leading innovation consulting firm, Sarasijam Technologies, answers such questions and provides a road-map to Indian innovation in its comprehensive multi-client study, ***Discoveries to Dividends: Leveraging India's Cost-Effective Innovation Resources***.

"India is a developing country with the scientific and technological infrastructure of a developed nation."

—Jack Welch,
former CEO,
General Electric

NAVIGATE YOUR R&D TO INDIA

Discoveries to Dividends will help you assess India's relevance to your firm's innovation strategy. It will also map your path to Indian innovation by answering questions such as:

- How diverse, capable, and credible is Indian innovation?
- Will India's intellectual property laws protect my R&D investments? Are they enforceable?
- Will Indian innovation complement my company's R&D expertise, work ethic, and culture?
- How have companies using Indian innovation benefited? What is their experience?
- Which Indian organizations and scientists are the best? How do we begin working with them?
- What are the business and economic drivers for the global innovation sourcing market?

Accurate, actionable, and meticulously researched, this report's features include:

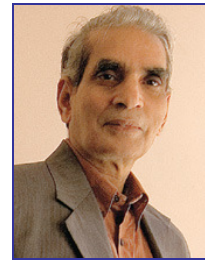
- 100+ pages
- 30 tables and figures
- 7 case-studies
- 50 organizational profiles
- SWOT and PEST analyses
- Based on 25 site-visits
- Insights from engagements with foreign firms using Indian R&D
- Analyses of India's scientific outputs (e.g., patents and papers)
- Developed by qualified Indian R&D professionals

The *Discoveries to Dividends* study includes:

- The report
 - Two hard copies
 - Soft copy (Adobe PDF file)
 - Summary presentation (Microsoft PowerPoint file)
- Five days of Sarasijam's consulting over 3-6 months

AUTHORED BY EXPERTS

Discoveries to Dividends was prepared by experienced and influential R&D professionals led by the Chairman and CEO of Sarasijam Technologies, **Dr. T.S.R. Prasada Rao**. Dr. Rao has 40 years of R&D experience and was the chief executive of two national laboratories, the Indian Institute of Petroleum and the Central Building Research Institute. Recognized globally with 17 awards, Dr. Rao has developed and commercialized more than 10 technologies and published 150 papers, 50 patents, and 3 books. Dr. Rao has shaped India's science, technology and energy policies by serving on India's Council of Scientific and Industrial Research (chaired by the Indian Prime Minister) and the Oil Industry Development Board. After founding Sarasijam in 1999, Dr. Rao has led the firm to service clients such as BP, Shell, Dow, BASF, Johns-Manville, and Reckitt Benckiser.



Dr. Prasada Rao
Chairman & CEO,
Sarasijam Tech.

USING THIS STUDY: CASE STUDIES

- **A European consumer products firm** used ***Discoveries to Dividends*** to source key R&D labs for targeted innovation needs.
- **A European energy major** used ***Discoveries to Dividends*** to educate senior management, identify relevant R&D labs, and, with Sarasijam's help, sign an agreement with India's largest R&D organization.
- **A U.S. diversified chemical company** used ***Discoveries to Dividends*** to establish an off-shored R&D center in India.
- **A U.S. independent R&D organization** used ***Discoveries to Dividends*** to analyze R&D off-shoring opportunities for its clients in India.

Sarasijam Technologies is a full-service innovation consulting firm. It can help companies take the next logical steps beyond this study. Its influential and well-connected management can identify partners, products, intellectual property, technologies, facilitate discussions and agreements, and provide on-site project monitoring in India.

POST-REPORT CONSULTING: Purchasing this study includes five days of consulting (within three months of purchase) with Sarasijam and its CEO, Dr. Prasada Rao. Your firm can use Sarasijam to conduct follow-up studies, profile additional organizations, facilitate agreements and site-visits, develop projects, and take the next logical steps to leveraging India's innovation resources.

ORGANIZATIONAL PROFILES: SNAPSHOT OF INDIAN INNOVATION

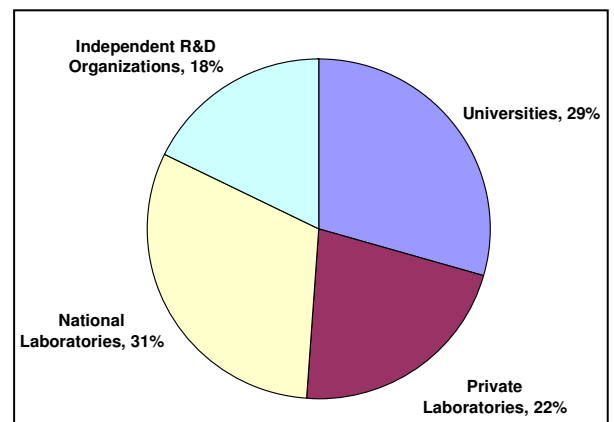
India's innovation infrastructure includes 400 public laboratories, 1,300 industrial research centers, and 210 educational institutions collectively employing around 300,000 people.

Discoveries to Dividends distills this vast infrastructure to 50 representative innovation providers (partial list below). Actionable information about these laboratories is presented in easily accessible one-page profiles (see page 10 for a sample profile).

One-page profiles in the study include organizational information such as:

- Focus areas
- Competencies
- Key investigators
- Budget and staff strength
- Clients
- Major projects
- Leadership contact info

1. Indian Institute of Science, Bangalore
2. Indian Institute of Technology, Mumbai
3. University of Mumbai, Mumbai
4. Indian Institute of Management, Ahmedabad
5. Shriram Institute of Industrial Research, Delhi
6. Vimta Labs Limited, Hyderabad
7. Reliance Life Sciences, Mumbai
8. The Energy and Resources Institute, Delhi
9. Tata Group of Companies, Pune
10. National Chemical Laboratory, Pune
11. Indian Institute of Petroleum, Dehradun
12. Indian Institute of Chemical Technology, Hyderabad
13. Central Fuel Research Institute, Dhanbad
14. National Physical Laboratory, Delhi
15. Central Glass and Ceramic Research Institute, Kolkata
16. Central Electrochemical Research Institute, Karaikudi
17. National Environmental Engineering Research Institute, Nagpur
18. National Metallurgical Laboratory, Jamshedpur
19. Central Scientific Instruments Organization, Chandigarh
20. Institute of Microbial Technology, Chandigarh
21. Central Salt and Marine Chemicals Research Institute, Bhavnagar
22. Centre for Mathematical Modeling and Computer Simulation, Bangalore
23. Tata Institute of Fundamental Research, Mumbai
24. Indian Association for the Cultivation of Science, Kolkata
25. National Institute of Industrial Engineering, Mumbai
26. Jawaharlal Nehru Center for Advanced Scientific Research, Bangalore
27. Central Institute of Plastics Engineering and Technology, Chennai
28. Centre for Wind Energy Technology, Chennai
29. Sardar Patel Renewable Energy Research Institute, Vallabh Vidyanagar



Distribution of organizations profiled in the Discoveries to Dividends study

STUDY CONTENTS

List of Tables and Figures

About Sarasijam Technologies

1. Executive Summary

2. Innovation and Emerging Global Paradigms

3. Sourcing Innovation from India

3.1. Historical overview

3.2. India's science, technology, and education infrastructure

3.3. Government support of science, technology, and education

3.4. Sourcing innovation: Advantage India

3.5. Sectoral reviews: (1) Pharmaceuticals and (2) Biotechnology

3.6. In-house corporate R&D capabilities

3.7. Intellectual property rights

3.8. Future outlook

3.9. Case study: GE's experience in sourcing innovation from India

4. Indian Innovation Organizations

5. Analysis of India's Innovation Capabilities

5.1. Political, Economic, Social, and Technological (PEST) analysis

5.2. Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis

6. Recommendations

6.1. Top 10 innovation organizations

6.2. Engagement strategies

Appendix I. Profiles of 50 Indian Innovation Organizations

Universities (14)

Private laboratories (11)

National laboratories (16)

Independent R&D organizations (9)

ABOUT SARASIJAM TECHNOLOGIES

Established February 1, 1999

General Information

Sarasijam Technologies is a leading consulting firm in India where it has helped more than 20 U.S. and European chemical, energy, and consumer product firms expand business, conduct R&D, develop technologies, and source intellectual property.

Capabilities & Competencies

- Vast and influential Indian network
- Proven technical and project management skills
- Client-centric and results-oriented
- Domain expertise in energy, petroleum refining, chemicals, petrochemicals, innovation, R&D, and business research

Products & Services

- Technology sales and licensing in India
- Sourcing technologies, IP, and R&D from India
- Marketing and business development in India
- Market intelligence and research
- Scientific and technical consulting

Clients

- BP
- Shell
- BASF
- Johns-Manville
- Dow Chemical Company
- Reckitt Benckiser

Chairman & CEO

Dr. T.S.R. Prasada Rao. Former Director, Indian Institute of Petroleum & Central Building Research Institute; Fellow, Indian Academy of Sciences and National Academy of Engineering; 40-year R&D management experience; Member, India's Oil Industry Development Board and Council of Scientific and Industrial Research.

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STUDY EXCERPTS

2.0 INNOVATION AND EMERGING GLOBAL PARADIGMS

Corporate strategy in the U.S. places high importance on research and development (R&D) because of its proven capability to improve competitiveness and profitability. Typically, companies have realized these gains through internally-focused innovation models (see Figure 1), which had the following characteristics:

- Belief and desire that all innovations should come from within the company,
- Recruit and hire all requisite competencies and the best people,
- Control and own all resultant intellectual property,
- First-to-market strongly correlated with first-to-discover,
- Few technologies in-licensed; few innovations out-licensed,
- Limited organizational experience in partnering with suppliers, vendor, or universities, and
- Limited effort at gathering technical intelligence or networking.

Companies successfully utilized these internally-focused innovation models through large in-house R&D organizations in the 1970s and 1980s. However, the 1990s were different and companies began witnessing the law of diminishing returns from the internally-focused innovation models. Globalization, increased competition, shortening product lifetimes, growing technical progress and complexity, the advent of new tools and techniques, and the drive towards increased fiscal efficiency all made R&D increasingly difficult and expensive. For example, although it costs \$0.8 to \$1.7 billion to develop a new drug and pharmaceutical companies tripled R&D spending to \$30 billion in the past decade, only 30 new drugs were launched in 2003—the lowest in more than 20 years.¹ This productivity crisis is compounded by expiring patents, which could affect \$60 billion of U.S. drug sales in the next decade.

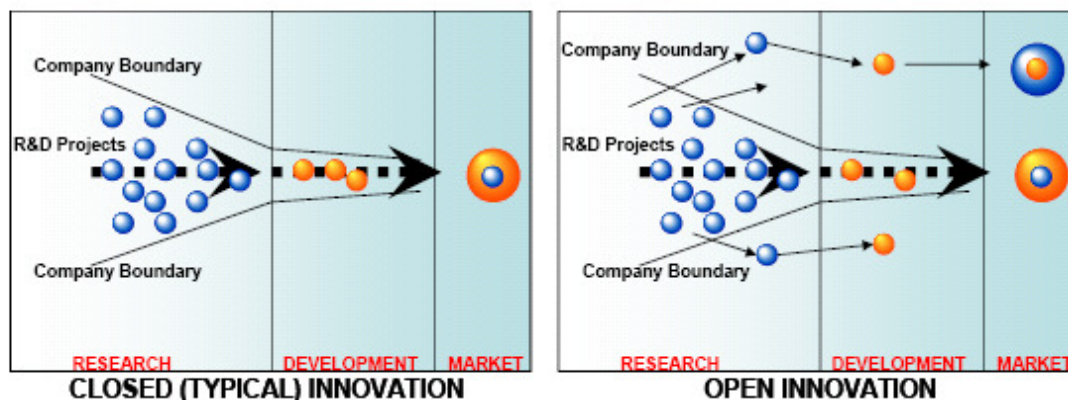


Figure 1. Schematic description of “open” and “closed” innovation models.²

¹ S. Class (IMS Health) Chemical & Engineering News, December 6, 2004, pp. 18-29.

² H. Chesbrough, *MIT Sloan Management Review*, Spring 2003.

3.2 India's Science, Technology, and Education Infrastructure

Science and Technology

India currently spends approximately \$6 billion on R&D. More than 70% of this expenditure is by the Indian government, which is the predominant R&D force in the country.³ Government-funded R&D is conducted and/or monitored by a slew of organizations under both the state and federal governments (see Figure 5) in areas as diverse as agriculture and healthcare to nuclear and space research. The most significant R&D organizations in the federal government include the Department of Science and Technology (DST), Department of Scientific & Industrial Research (DSIR), Department of Atomic Energy (DAE), Department of Space (DoS), Department of Ocean Development (DOD), Department of Biotechnology (DBT) and Department of Ocean Development (DOD).

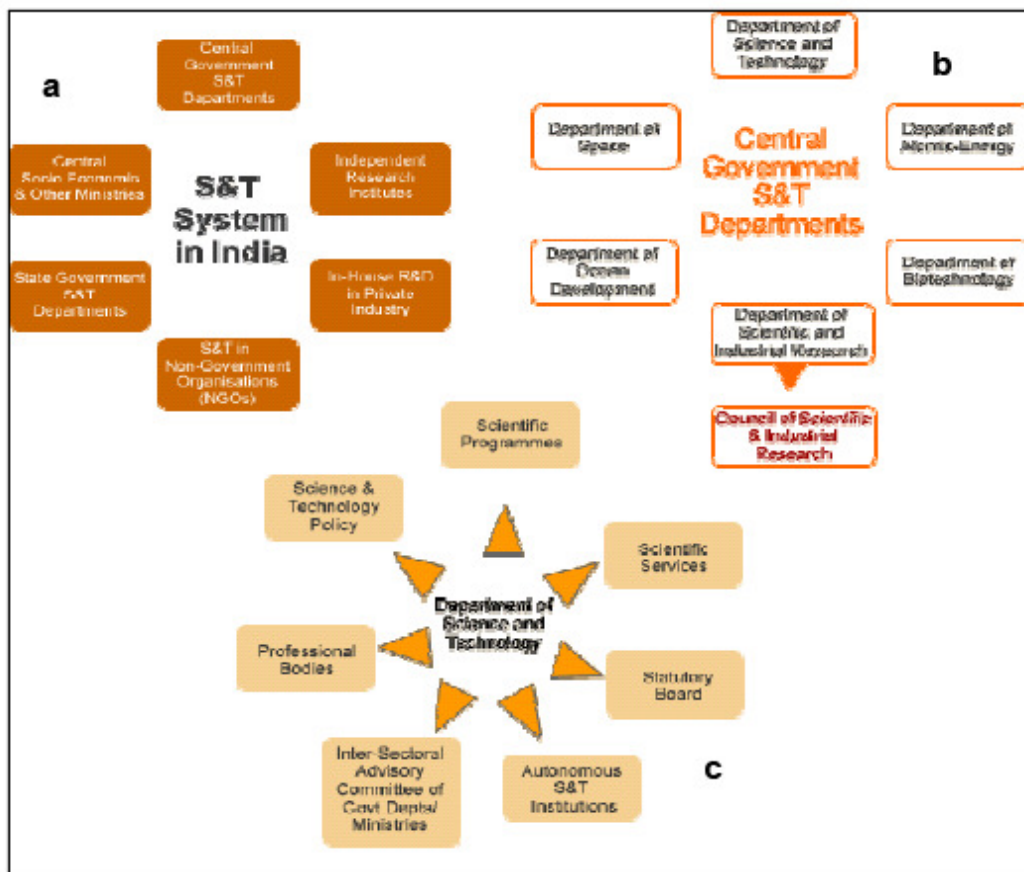


Figure 5. (a) India's science & technology (S&T) system. (b) Various departments within the federal (central) government. (c) Science, technology, and R&D programs administered by the Department of Science and Technology.

3.7 Intellectual Property Rights

January 1, 2005 marked India's full embracing of the intellectual property rights system formulated by the World Trade Organization and similar in scope and spirit to those in the U.S. and European Union. Through an ordinance issued in December 2004 that was approved by the Indian Parliament in March 2005 as an amendment of India's patents act, the Indian government has transformed securing, protecting, and enforcing intellectual property rights in India. These new laws will go a long way in reducing and eliminating the developed world's poor perception of intellectual property rights in India.

This four decades-long perception derived from Indian laws (see Table 6) that did not allow product patents and, instead, granted process patents only. This allowed Indian businesses to patent and practice new processes to manufacture products discovered and patented elsewhere. Several Indian pharmaceutical firms took advantage of this legal environment to produce drugs patented elsewhere for sale within India and even select international markets.

Table 6. Chronological summary of India's intellectual property rights laws.

1911	The Patents and Designs Act <ul style="list-style-type: none"> • Protection of all inventions except those relating to atomic energy • Patent term of 16 years from the date of application • Perceived by Indian industry to unfairly limit their entry into certain areas
1970	The Indian Patents Act <ul style="list-style-type: none"> • Reduced the scope of patentability in food, chemicals, and pharmaceuticals to only processes and not products • Process patents term reduced to seven years in food, drugs, and chemicals and to 14 years for other products • Compulsory licenses could be issued after three years

SAMPLE ORGANIZATIONAL PROFILE

Organization	National Chemical Laboratory, Pune, Maharashtra						
Type	National Laboratory	URL	http://www.ncl-india.org				
Established	1950	Staff	1559	PhDs	200	Budget	\$8.7MM
Focus Areas	Polymer Science, Organic Chemistry, Catalysis, Materials Chemistry, Chemical Engineering, Biochemical Sciences, and Process Development						
Competencies	Heterogeneous/homogeneous catalysis, Polymer chemistry, Polymer physics, Complex fluids and polymer engineering, Polymer/materials modeling, Membrane science/technology, Nanomaterials, Theory and computational science, Reaction engineering, Process simulation and modeling, Biochemical engineering, Industrial flow modeling, Process design/development of processes for fine chemicals/polymers, Chiral synthesis, Process chemistry for active pharmaceutical intermediates, Multi-step organic synthesis of complex molecules, Bio-organic and bio-mimetic chemistry, Molecular diversity based chemical genetics, Industrial microbiology, Plant molecular biology, Plant tissue culture						
Key Principal Investigators	S. Sivaram (Polymers), P. Ratnasamy (Catalysis), B.D. Kulkarni (Chemical Engineering), G. Pandey (Organic Chemistry), A.K. Lele (Chemical Engineering), K.N. Ganesh (Organic Chemistry), Rajiv Kumar (Catalysis)						
Infrastructure	World-class. Facilities include laboratories, pilot plants, sophisticated instruments, information infrastructure, and workshops.						
Clients	General Electric, UOP, DuPont, Huntsman Chemicals, Unilever, Akzo, Neste OY, Rhone Poulenc, Dow Chemicals, Eastman Chemicals, Pfizer, Polaroid, Lyondell, Daelin, Idemitsu Kosan, and Petronas						
Major Projects	<ul style="list-style-type: none"> • Catalyst and process development for linear alkyl benzene • Synthesis of polymer nanoparticles via dispersion polymerization • Non-linear dynamics and chaos theory for reactor modeling • Preparation, characterization, and application of ceramic oxides 						
Head/Director	Swaminathan Sivaram, Director, National Chemical Laboratory, Pune 411008, Maharashtra, Phone +91-20-25893300, Fax +91-20-25893619, E-Mail sivaram@ems.ncl.res.in						
Comments	<ul style="list-style-type: none"> • About 400 graduate (PhD) students; about 50 awarded PhD every year; a strong and young renewing talent pool. • Publishes the second largest number of papers in chemical sciences (~ 430), files the largest number of patents, both in India (~60) and abroad (~60) and produces the largest number of PhDs in Chemical Sciences in India. 						

ORDER FORM

DISCOVERIES TO DIVIDENDS

- **Price:** U.S. \$10,000 (Ten thousand U.S. dollars)
- **Deliverables:**
 - The report
 - Two hard copies
 - One soft copy (Adobe PDF file)
 - Summary presentation (Microsoft PowerPoint file)
 - Five days of Sarasijam's consulting over 3-6 months

Please send this form to: Dr. T.S.R. Prasada Rao, Chairman, Sarasijam Technologies, DDA HIG Flat No. 600, Sector 13, Pocket B, Dwarka, New Delhi 110045, India; Phone: +91 981 033 8091; E-Mail: Sarasijam.Tech@gmail.com

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