

Innovation and Patents

NOVEMBER
2011



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Innovation and Patents

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- ❖ Advantage India
- ❖ Market overview and trends
- ❖ Growth drivers
- ❖ Success stories: Ranbaxy, Infosys
- ❖ Opportunities
- ❖ Useful information

For updated information, please visit www.ibef.org

Advantage India

Strong demand

- Rising income and evolving lifestyles have led to higher demand for aspirational products
- Companies need to innovate to gain and sustain competitive edge

Attractive opportunities

- Vast opportunities in IT, pharmaceuticals, automobiles, biotechnology and agriculture
- India is the largest exporter of IT products and has the third largest pharma sector with a fast growing contract research segment

2011E

R&D
spending:
USD36.1
billion

Advantage India

Quality and affordability

- Establishment of CoEs in various areas; NMITLI initiative on PPP basis
- Increased investments by private players; setting up of R&D centres
- During FY06-FY10, trademark and patent applications increased at a CAGR of 13 per cent and 9 per cent respectively

Policy support

- PPP for promoting exchange of scientific knowledge and R&D
- Strengthening educational infrastructure
- Amendments to the Patents Act (1970) to make it TRIPS-compliant

2009

R&D
spending:
USD28.1
billion

Source: 2011 R&D spending estimate by Battelle, 2011 R&D Funding Forecast, Battelle, Electronics for You, ARAI, Business Standard, Aranca Research

Notes: CoE- Centre of Excellence, PPP- Public Private Partnership, TRIPS- Trade Related Aspects of Intellectual Property Rights, NMITLI- New Millennium Indian Technology Leadership Initiative, E Estimate

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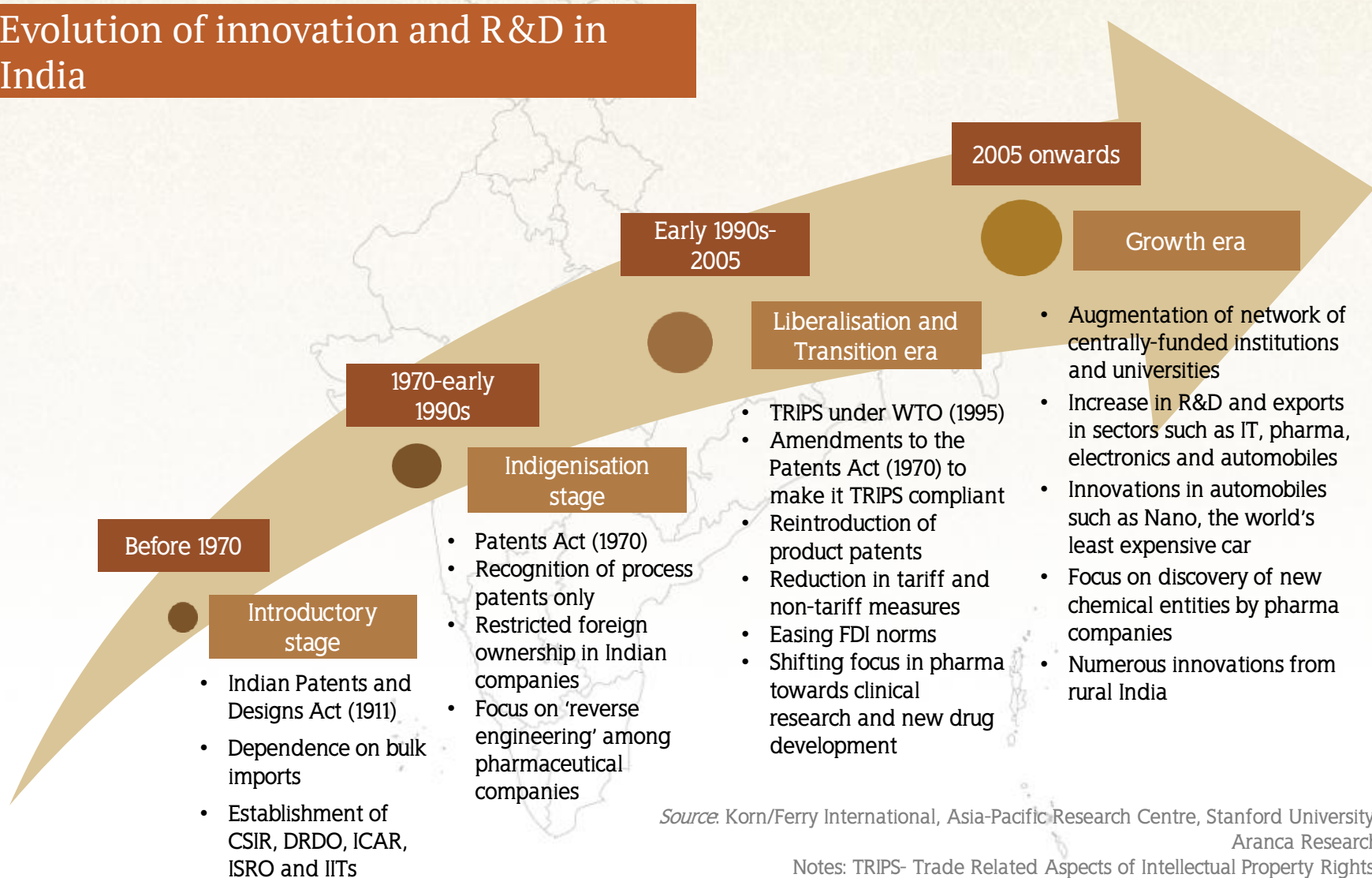
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Evolution of innovation and R&D in India

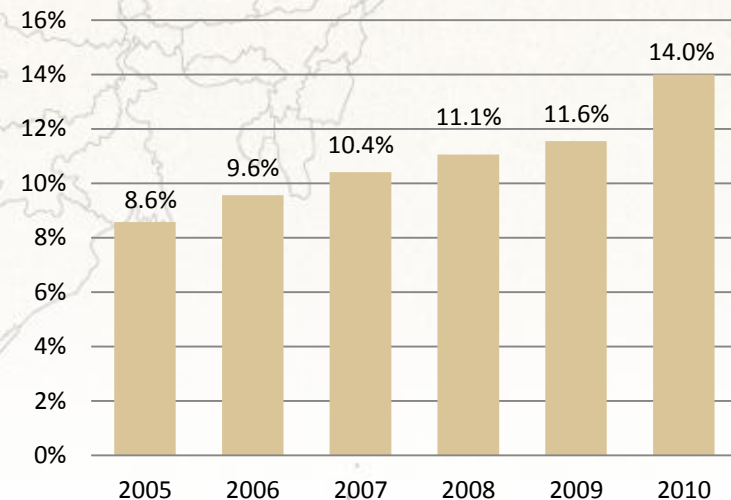


Progressing innovation landscape in India ... (1/4)

- Share of knowledge-intensive production in India's GDP increased from 8.6 per cent to 14.0 per cent during 2005-2010
- Absolute growth in knowledge intensive production was at a CAGR of 17.2 per cent
- Much of the knowledge-intensive production is from the services sector
- Majority of the companies incorporated in the past eight years belong to the knowledge-intensive sector

Note: GDP- Gross Domestic Product

Share of knowledge-intensive production in GDP



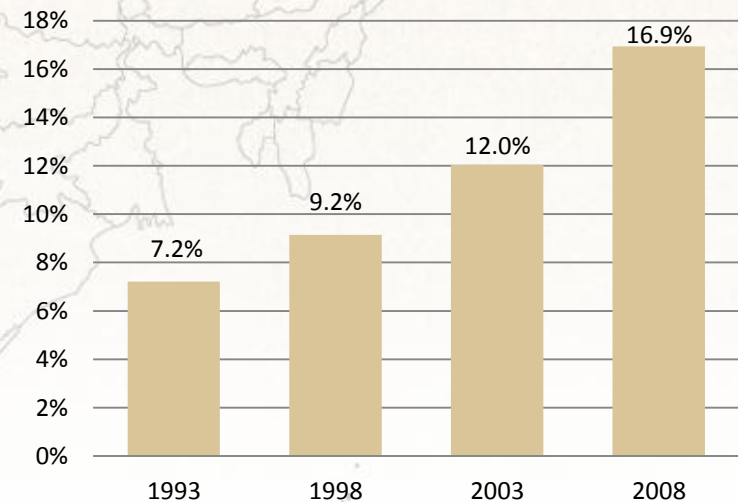
Source: UNESCO Science Report 2010, Aranca Research

Progressing innovation landscape in India ... (2/4)

- The share of high-tech products in India's manufactured exports increased from 7.2 per cent to 16.9 per cent during 1993-2008
- India has become world's largest exporter of IT services since 2005
- Exports of aerospace products are growing at a fast pace; space research alone accounts for about 12 per cent of GERD in India

Notes: GERD- Gross Domestic Expenditure on R&D, R&D- Research and Development, IT- Information Technology

High-tech content of manufactured exports

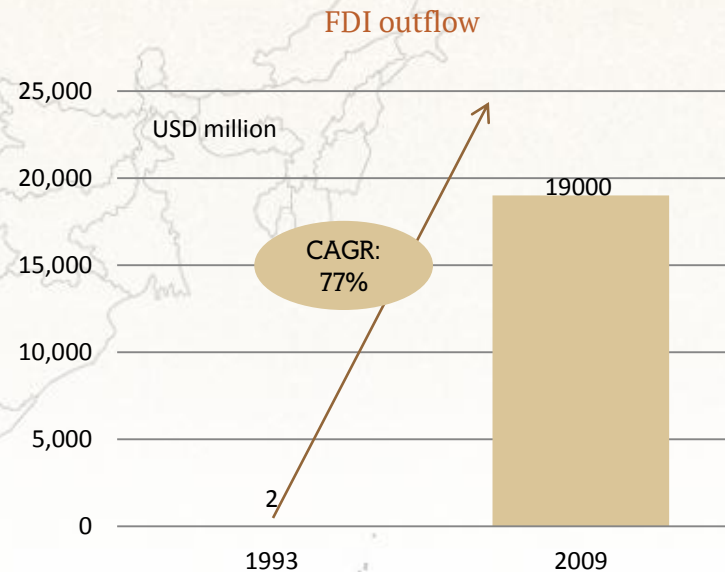


Source: UNESCO Science Report 2010, Aranca Research

Progressing innovation landscape in India ... (3/4)

- FDI outflow from India grew at a phenomenal CAGR of 77 per cent from USD2 million to USD19 billion during 1993-2009
- This has led to significant amount of technology transfer through industrial acquisitions
- For instance, Tata Steel's takeover of Corus brought with it more than 80 patents and 1,000 researchers

Notes: FDI- Foreign Direct Investment,
CAGR- Compound Annual Growth Rate

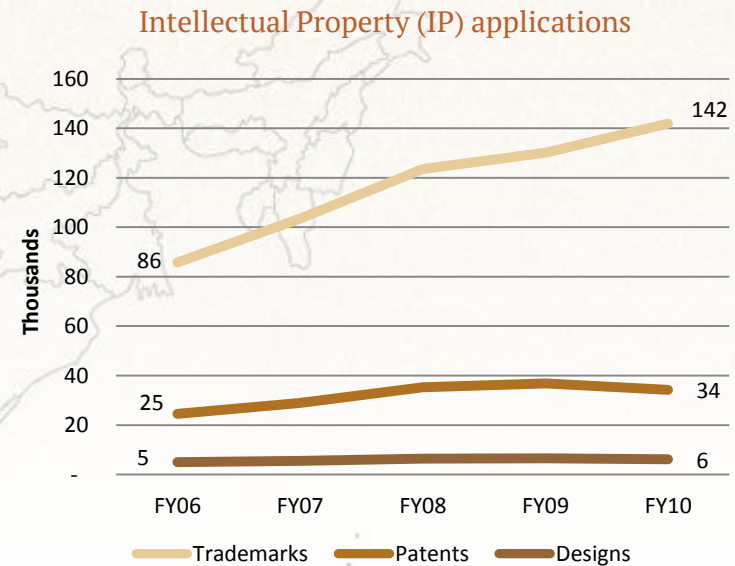


Source: UNESCO Science Report 2010, Battelle, Aranca Research

Progressing innovation landscape in India ... (4/4)

- During FY06-FY10, trademark applications increased at a CAGR of 13 per cent from 85,699 to 141,943, patent applications increased at a CAGR of 9 per cent from 24,505 to 34,287 and design applications increased at a CAGR of 5 per cent from 4,949 to 6,092
- Growing IP application activity indicates increased in-house R&D and innovation

Notes: CAGR- Compound Annual Growth Rate, R&D- Research and Development

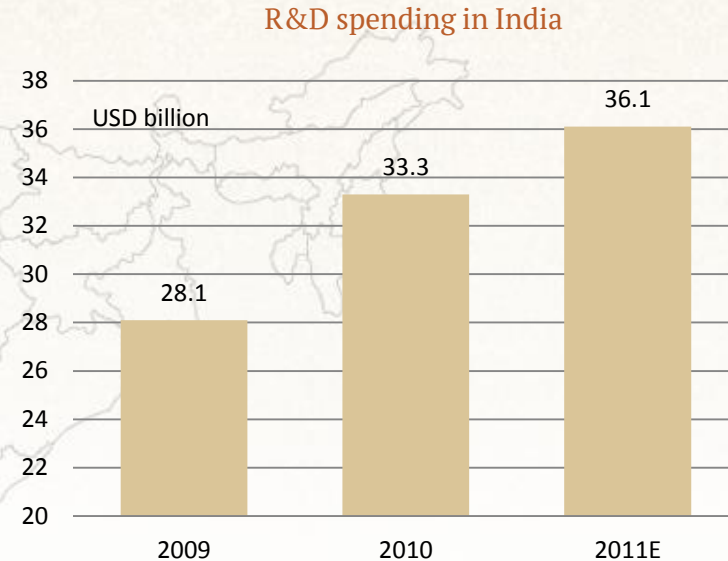


Source: Office of the Controller General of Patents, Designs and Trademarks 2009-10 annual report

R&D expenditure in India is growing rapidly ... (1/2)

- India had the eighth largest annual R&D investment in the world in 2010
- The country's share in global R&D spending rose to 2.9 per cent in 2010 from 2.5 per cent in 2009
- India's R&D investment growth is likely to outpace its GDP growth. During 2009-2011, R&D spending is expected to expand at a CAGR of 13 per cent from USD28.1 billion to USD36.1 billion

Notes: E-Estimate, R&D- Research and Development



Source: Battelle, 2011 R&D spending estimate by Battelle, 2011 R&D Funding Forecast, Aranca Research

R&D expenditure in India is growing rapidly ... (2/2)

World's leading R&D investors (2010)	
Country	GERD PPP (USD billion)
United States	395.8
Japan	142.0
China	141.4
Germany	68.2
South Korea	42.9
France	41.5
United Kingdom	37.6
India	33.3
Canada	23.7
Russia	22.1

Source: Battelle, Aranca Research




Notes: GERD- Gross Domestic Expenditure on R&D, R&D- Research and Development , PPP- Purchasing Power Parity

Key players in R&D - Scientific and R&D organisations* ... (1/2)

Organisation	Business description
	<p><u>Council of Scientific and Industrial Research (CSIR)</u></p> <ul style="list-style-type: none"> • CSIR is India's largest R&D organisation, with 39 laboratories and 50 field stations • It is engaged in scientific industrial R&D for economic, environmental and societal benefits for the country • Its research areas span across aerospace, biotechnology, chemicals, energy, foods, information dissemination, leather and metals, minerals and manufacturing etc.
	<p><u>Defence Research and Development Organisation (DRDO)</u></p> <ul style="list-style-type: none"> • DRDO is engaged in design and development of weapon systems and equipment in accordance with the requirements of the military services • Its research areas include aeronautics, armaments, combat vehicles, electronics, instrumentation engineering systems, missiles, materials, naval systems, advanced computing, simulation and life sciences
	<p><u>Indian Council of Agricultural Research (ICAR)</u></p> <ul style="list-style-type: none"> • ICAR is one of the largest national agricultural organisations in the world, with 97 ICAR institutes and 47 agricultural universities spread across India • It is the apex body for coordinating, guiding and managing research and education in agriculture, including horticulture, fisheries and animal sciences in India

Source: Organisational websites, Aranca Research
Notes: R&D- Research and Development
*This list is indicative




Key players in R&D - Scientific and R&D organisations* ... (2/2)

Organisation	Business description
	<p><u>India Space Research Organisation (ISRO)</u></p> <ul style="list-style-type: none"> • ISRO is engaged in development of space technology and its application to various national tasks • Its research areas include communication satellites for television broadcast, telecommunications and meteorological applications, and remote sensing satellites for management of natural resources
	<p><u>Indian Council of Medical Research (ICMR)</u></p> <ul style="list-style-type: none"> • ICMR is the apex body in India for the formulation, coordination and promotion of biomedical research and one of the oldest medical research bodies in the world • The council's research priorities encompass the areas of communicable diseases, fertility control, maternal and child health, nutritional disorders, and non-communicable diseases such as cancer, cardio-vascular diseases, blindness and diabetes
	<p><u>Centre for Development of Advanced Computing (C-DAC)</u></p> <ul style="list-style-type: none"> • CDAC is a premier R&D organisation of the Department of Information Technology (DIT) • It is engaged in research in the areas of supercomputers, applied electronics, technology and applications

Source: Organisational websites, Aranca Research




*This list is indicative

Key players in R&D- Institutes and universities* ... (1/2)

Organisation	Business description
	<p><u>Indian Institutes of Technology (IITs)</u></p> <ul style="list-style-type: none"> • It is a group of autonomous engineering and technology oriented institutes of higher education • In FY10, IITs filed the highest number of patent applications amongst all the institutes and universities in India
	<p><u>National Dairy Research Institute (NDRI)</u></p> <ul style="list-style-type: none"> • NDRI is engaged in research, teaching and extension activities in areas of dairy production, processing, management and human resource development • Its research activities focus on improving dairy productivity, innovating milk processing technologies and disseminating information to the various stakeholders in dairy business to make dairying a self-sustaining business
	<p><u>Indian Institute of Science (IISc)</u></p> <ul style="list-style-type: none"> • IISc is one of the earliest instances of PPP for a research institute in India • It is engaged in research in various departments of science such as biological, chemical, electrical, mathematical, physical and mechanical sciences • In FY10, the institute filed the third highest number of patent applications amongst all the institutes and universities in India

Source: Organisational websites, Aranca Research
 Notes: FY- Financial Year, PPP- Public Private Partnership
 *This list is indicative




Key players in R&D- Institutes and universities* ... (2/2)

Organisation	Business description
	<p><u>The Energy and Resources Institute (TERI)</u></p> <ul style="list-style-type: none"> • TERI is engaged in developing solutions to global problems in fields of energy, environment and sustainable development • The important research areas include biotechnology, earth science and climate change, technology development, social transformation, and modelling and economic analysis
	<p><u>Institute of Life Sciences (ILS)</u></p> <ul style="list-style-type: none"> • ILS undertakes basic and translational research in frontier areas of life sciences • The institute's research interests are in the areas of infectious disease biology, gene function and regulation, and translation research and technology development
	<p><u>Indian Institute for Advanced Studies (IIAS)</u></p> <ul style="list-style-type: none"> • IIAS is a residential centre for advanced research in humanities, social sciences and natural sciences • Its major research areas include social, political and economic philosophy; comparative studies in philosophy and religion; education, culture and arts; natural and life sciences; and national integration and nation building

Source: Organisational websites, Aranca Research

*This list is indicative

Key players in R&D- Private sector companies*

Organisation	Business description
	<p><u>Hindustan Unilever Limited</u></p> <ul style="list-style-type: none"> • HUL is credited with innovations in product areas such as structured bar soap, fairness cream, zero alcohol soap, poly-coated scouring bar for dishwashing, fortified salt, instant tea, critical components for a water purifying device, and value-added (nature care) tea • The company filed 103 patent applications and was one of the top Indian patentees in FY10
	<p><u>Tata Steel Limited</u></p> <ul style="list-style-type: none"> • Tata Steel undertakes research in areas such as raw materials and coke, iron and ferro alloys, steel making, coated products, materials characterisation and joining, materials modelling and product design, and refractory technology • The company filed 30 patent applications in FY10
	<p><u>Cipla Limited</u></p> <ul style="list-style-type: none"> • Cipla's R&D division focuses on new product development and new drug delivery systems across a range of therapies • In FY10, the company's total R&D spending was about 5 per cent of the total turnover; during that year the company filed 21 patent applications and was one of the top Indian applicants for patents in the pharmaceutical industry

Source: Organisational websites, Aranca Research

*This list is indicative

Incredible innovations from rural India



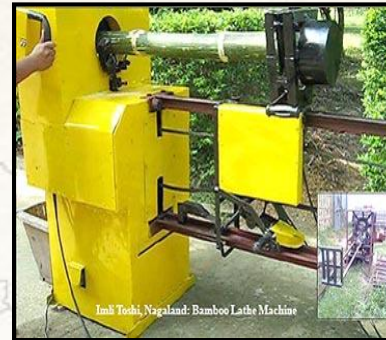
Reaper windrower machine

- For easy and timely harvesting of soyabean crop
- Prevents shattering of soyabean pods due to non-availability of labourers for harvesting the crop in time



Hand operated water lifting pump

- For convenient water-lifting at a good discharge rate and low cost
- The pump was built in response to a dearth of available pumps that could be afforded by small farmers



Bamboo lathe machine

- For stripping off the outer covering of bamboo to develop a smooth surface for making interior decoration and utility items
- Reduces the time and labour required to do the job manually



Pedal operated washing machine

- For washing clothes while exercising on a pedal machine
- An affordable and convenient way of washing clothes in rural India which experiences frequent power shortages

Source : Rediff Business, Aranca Research

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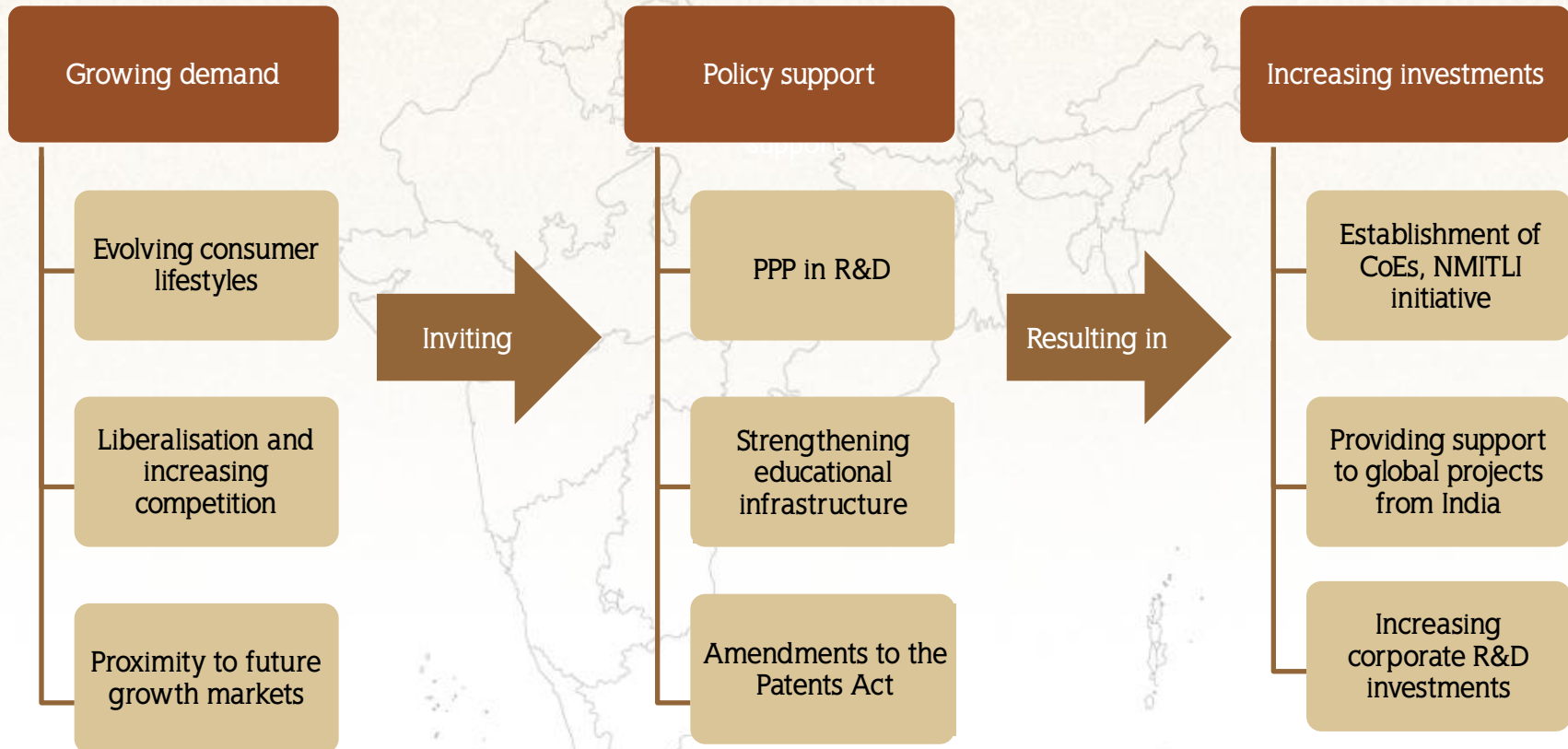
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Strong demand and policy support driving investments



Sources: Battelle, Electronics for You, Organisational websites, Aranca Research
Notes: PPP- Public Private Partnership, R&D- Research and Development, NMITLI- New Millennium Indian Technology Leadership Initiative, CoE- Centre of Excellence

Policy support aiding growth in the sector

PPP in R&D

- Exchange of scientific knowledge between research centres, national laboratories, institutes of higher learning and the industry
- Setting up of Centres of Excellence (CoEs) in various areas
- New Millennium Indian Technology Leadership Initiative (NMITLI)

Funded Institutions and Foreign universities

- Increasing the number of Indian Institutes of Technology (IITs) to 16, establishing 3 new Indian Institute of Science Education and Research (IISER) and 30 central universities
- Foreign universities permitted to enter the higher education system in India by establishing their own campuses or joint ventures with existing universities

Tax incentives

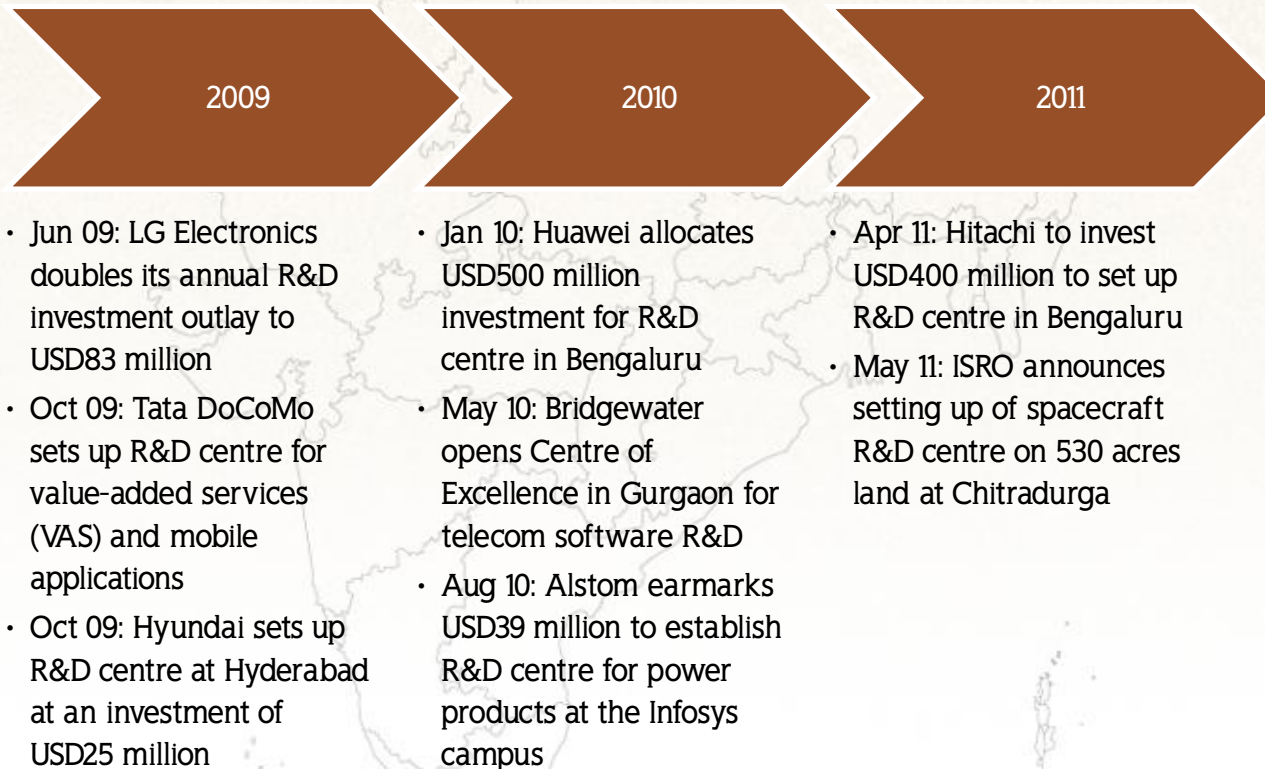
- India has a very favourable tax regime for R&D providing deductions for donations, expenditure on R&D, customs duty benefits and various state government sops
- Government offers 200 % deduction for capital and revenue expenditure incurred by manufacturing companies with in-house R&D
- Income tax exemption of 125 % to 175 % on donations made to universities, colleges and other scientific associations

Patents Act

- Amendments to the Patents Act, 1970 to make it TRIPS compliant
- Increased incentives to domestic firms to conduct R&D
- Increased likelihood of technology transfer from developed nations

Source: Battelle, Electronics for You, Organisational websites, Aranca Research
Notes: PPP- Public Private Partnership

Recent investments in R&D by key players



Source: India Electronic News, Moneycontrol, CNBC, Economic Times, ApplianceMagazine.com, Business Standard, company websites, Aranca Research
Notes: R&D- Research and Development

Public sector investments in R&D

Centres of Excellence (CoEs)

- The government has set up CoEs based on the PPP model for technology development and transfer, scientific research, human resource development and economic outreach
- CoEs have been set up in the areas of telecom, wireless technology, bio-informatics, lasers and optoelectronic devices and nano-electronics

NMITLI

- The programme identifies areas for development based on national consultation and invites best partners from institutions, academia and private sector to play a role in the process
- NMITLI has so far initiated 60 largely networked projects in diverse areas involving 85 industry partners and 280 R&D groups from different institutions

Centrally funded institutions

- The government proposes to establish 8 new IITs, 3 IISERs, 10 NITs and 20 IIITs by 2012
- These institutes together account for over 80 per cent of the total PhDs in engineering in India
- The institutes are also amongst the top Indian applicants for patents from the 'institutes and universities' category

Central and foreign universities

- Government to set up 30 new central universities by 2012
- New universities in 16 uncovered states
- The remaining 14 new Central Universities will be set up as world class centres of excellence at different locations
- Foreign universities permitted to enter the higher education system in India by establishing their own campuses or joint ventures with existing universities

Source: Electronics for You, CSIR, Aranca Research, Business Standard

Notes: CoE- Centre of Excellence, NMITLI- New Millennium Indian Technology Leadership Initiative

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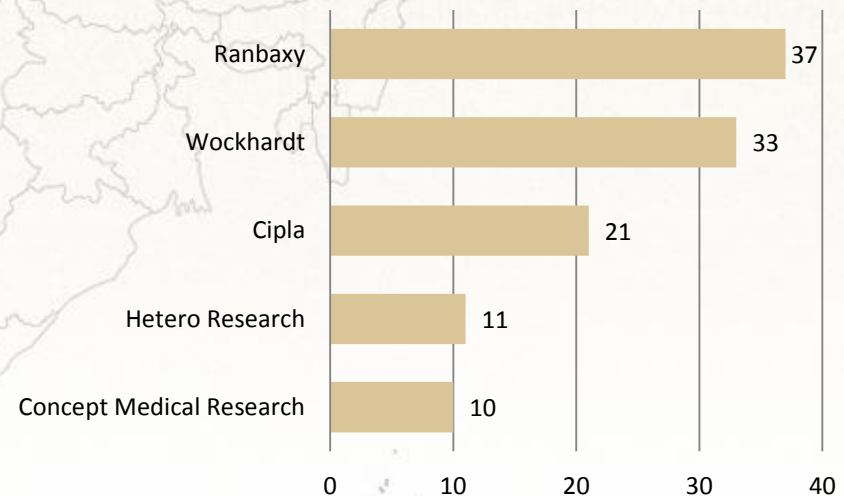
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Ranbaxy: Leading innovator in pharmaceuticals ... (1/2)

- Ranbaxy filed the highest number of patent applications in the Indian pharmaceutical sector, followed by Wockhardt and Cipla
- Specific R&D focus includes technology development for APIs, platform technologies and products in the area of novel drug delivery systems, and discovery and development of new drug molecules

Notes: API- Active Pharmaceutical Ingredient

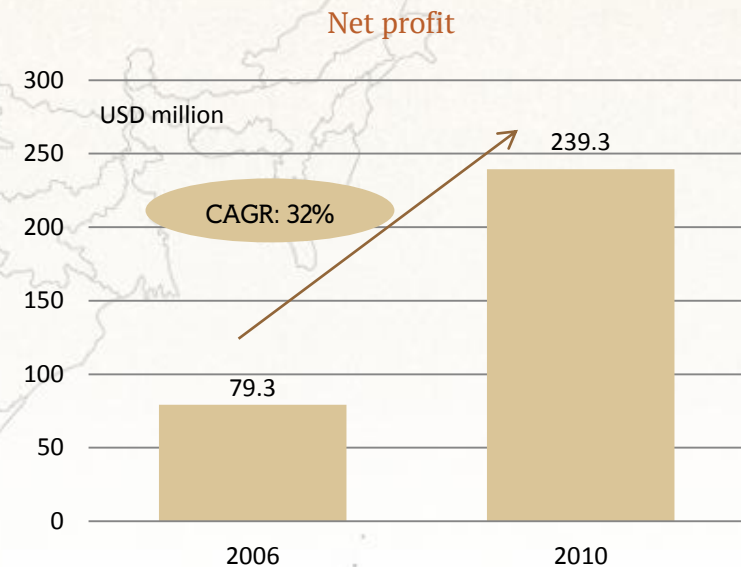
Indian pharmaceutical patent applications (FY10)



Source: Office of the Controller General of Patents, Designs and Trademarks 2009-10 annual report, company annual reports, Aranca Research

Ranbaxy: Leading innovator in pharmaceuticals ... (2/2)

- During FY06-FY10, the company's net profit grew at a CAGR of 32 percent from USD79.3 million to USD239.3 million despite a slower growth in revenues (CAGR of 7 per cent)
- Total expenditure on R&D during FY10 was equivalent to 9.5 per cent of turnover

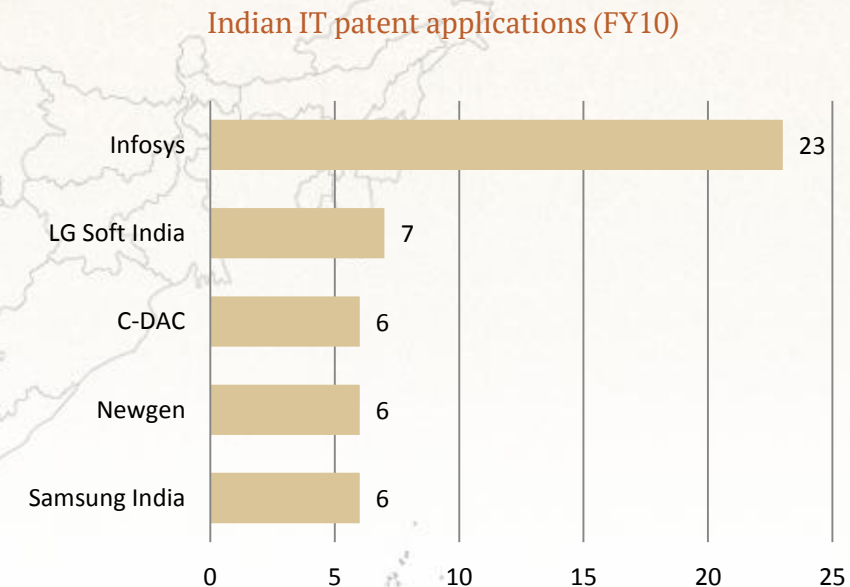


Source: Company annual reports, Aranca Research

Infosys: Nurturing innovation in IT ... (1/2)

- Infosys filed the highest number of patent applications in the Indian IT sector, followed by LG Soft India and C-DAC
- Research activity for different areas was allocated amongst dedicated labs such as Software Engineering lab, Convergence lab, Security and Privacy lab, Distributed Computing lab and E-Com lab

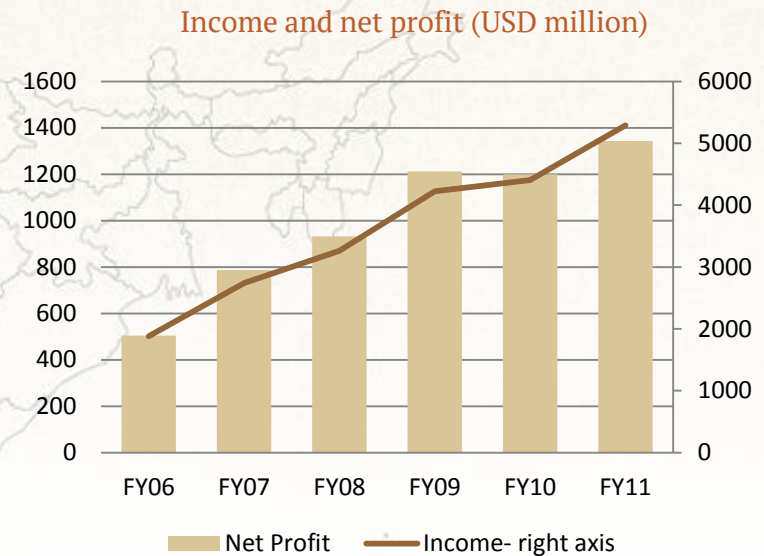
Notes: IT- Information Technology



Source: Office of the Controller General of Patents, Designs and Trademarks 2009–10 annual report, company annual reports, Aranca Research

Infosys: Nurturing innovation in IT ... (2/2)

- During FY06-FY11, the company's net profit grew at a CAGR of 22 percent from USD504.4 million to USD1342.3 million, in line with the growth in income at a CAGR of 23 per cent
- Total expenditure on R&D during FY11 was equivalent to 2.1 per cent of the total revenue



Source: Company annual reports, Aranca Research

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Opportunities

Pharma and Healthcare

- Contract research is a fast growing segment in the Indian healthcare industry
- India's huge population places it among the world's largest markets for vaccines and drugs

Information Technology (IT)

- India is increasingly seen as a product development destination
- Companies are now offshoring complete product responsibility including complex services like product management

Automobiles

- Research is being carried out by individual companies as well as industry associations such as ARAI in various areas such as structural dynamics, safety, NVH and electronics
- India is the sixth largest auto market globally and is poised to become the third largest by 2020

Biotechnology

- Protein and antibody production, and fabrication of diagnostic protein chips are promising areas for investment
- Stem cell research, cell engineering and cell-based therapeutics are other areas, wherein India will cash in its expertise

Agriculture

- India has the potential to become a major producer of transgenic rice and several genetically modified (GM) or engineered vegetables
- Hybrid seeds, including GM seeds, represent new business opportunities in India based on yield improvement

Source: ARAI, Business Standard, India Law Office, Aranca Research

Notes: IT- Information Technology, ARAI- Automotive Research Association of India, NVH- Noise, Vibration and Harshness

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Industry Associations

Automotive Research Association of India (ARAI)

Survey No 102, Vetal Hill, Off Paud Road, Kothrud, Pune - 411 038

Tel: 91-020 30231111

Fax: 91-020 25434190

E-mail: info@araiindia.com

Website: www.araiindia.com

Indian Society for Clinical Research (ISCR)

c/o Pfizer Centre, 5, Patel Estate, S.V.Road, Jogeshwari(West),
Mumbai-400 102

Tel: 91-022 26774140, 66932028

E-mail: info@iscr.org

Website: www.iscr.org

The South India Textile Research Association (SITRA)

13/37, Avanashi Road, Coimbatore - 641 014

Tel: 91-422 2574367, 6544188

Fax: 91-422 2571896

Email : sitraindia@dataone.in

Website: www.sitra.org.in

Glossary ... (1/2)

- **API:** Active Pharmaceutical Ingredient
- **ARAI:** Automotive Research Association of India
- **CAGR:** Compound Annual Growth Rate
- **CoE:** Centre of Excellence
- **FDI:** Foreign Direct Investment
- **FY:** Indian Financial year (April to March)
 - So FY10 implies April 2009 to March 2010
- **GDP:** Gross Domestic Product
- **GERD:** Gross Domestic Expenditure on Research and Development
- **IT:** Information Technology

Glossary ... (2/2)

- **NMITLI:** New Millennium Indian Technology Leadership Initiative
- **NVH:** Noise Vibration and Harshness
- **PPP:** Public Private Partnership
- **PPP:** Purchasing Power Parity
- **R&D:** Research and Development
- **TRIPS:** Trade Related Aspects of Intellectual Property Rights
- **USD:** US Dollar – Conversion rate used: USD1= INR48
- **WTO:** World Trade Organisation
- Wherever applicable, numbers have been rounded off to the nearest whole number

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