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ENTREPRENEURSHIP IN BIOTECHNOLOGY AND CAREER DEVELOPMENT

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ABSTRACT

Biotechnology has a major impact on almost all major sectors of industry and represents a major element in the transition from an agricultural-based to a knowledge- based economy.In the contemporary world many countries have been continuously stimulating attention towards preparation of students who would serve as entrepreneurs in the biotechnology industry. Mostly, countries try to create a knowledge-driven economy, without rhetoric and incapable policies, through creation of a highly skilled workforce via investments in university-based research and teaching. The current generation of biotechnologists will try their hands in a globalised society. thus, students have to stay on their toes and cultivate flexibility, creativity and critical thinking skills at universities to keep up with the competiton and hustles of the fast moving and innovative market. Biotech innovation may begin in the laboratory of a university, government agency, or private company, its ultimate success often requires these three institutions to collaborate in order to develop innovations and bring them to market. Innovation in Biotechnology is the union of scientific discovery and capital can flourish in a supportive research and regulatory environment. These key policy principles will help facilitate the discovery, development, and commercialization of biotech products that will fight disease, feed the hungry, and improve the environment.

KEYWORDS: Entrepreneurship, product development, marketing, research, licensing.

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INTRODUCTION

Rapid pace of discovery in the biological sciences and a tremendous impact on both fundamental and applied research have revolutionized Biotechnology. Biotechnology has been the path by which a number of scientists, researchers and investors have boosted their wealth over the past year. Biotechnology is a prospective aspect which overcomes food shortages, improves the environment, heals or eliminates disease and leads to a prosperous and healthy society. These qualities project a positive future. In recent years, the researcher-entrepreneur has become a role model in research institutions and business circles [1]. From Science to Solutions [2] provides a real-world introduction to starting and growing life science companies, as well as useful material for medical researchers interested in getting their technologies to as many patients as possible. Founding a company - or playing an active role (e.g., serving as scientific director or member of the scientific advisory board - translates to investing your time, energy, and (in some instances) money. Entrepreneurship is a decision fraught with potential peril.

Below is the most recent list of Top 35 Biotech Institutes offering Biotech in India

S.No	Name of the Institute	Address
1.	Rajiv Gandhi Center for Biotechnology, Trivandrum	Trivandrum, Kerala
2.	School of Life Sciences, University of Hyderabad	Hyderabad, Andhra Pradesh
3.	National Dairy Research Institute, Karnal	Karnal, Haryana
4.	Institute of Chemical Technology, University of Mumbai	Mumbai, Maharashtra
5.	Department of Biochemical Engineering & Biotechnology, Indian Institute of Technology	New Delhi
6.	University School of Biotechnology, Guru Govind Singh Indraprasths University	New Delhi
7.	Department of Microbiology & Biotechnology Centre, Faculty of Science, The Maharaja Sayaji Rao University of Baroda	Vadodra, Gujarat
8.	Department of Animal Biotechnology, Madras Veterinary College, Tamilnadu Veterinary and Animal Sciences University	Chennai, Tamil Nadu
9.	University Institute of Engineering & Technology, Punjab University	Chandigarh
10.	Department of Plant Molecular Biology & Biotechnology, Tamil Nadu Agricultural University	Coimbatore, Tamil Nadu
11.	Bioinformatics Centre, University of Pune	Pune, Maharashtra
12.	Avinashilinagam University for Women	Coimbatore, Tamil Nadu
13.	Center for Biotechnology, Anna University	Chennai, Tamil Nadu
14.	Dr BC Guha Center for Engineering & Biotechnology, University of Calcutta	Kolkata, West Bengal
15.	Department of Biotechnology, University of Kashmir	Hazratbal, Jammu & Kashmir
16.	Guru Jambheshwar University of Science & Technology, Hisar	Hisar, Haryana
17.	School of Biotechnology, Madurai Kamraj University	Madurai, Tamil Nadu
18.	Department of Biochemistry, University of Lucknow	Lucknow, Uttar Pradesh
19.	Department of Biotechnology, Cochin University of Science & Technology	Cochin, Kerala
20.	Department of Microbiology, Bangalore University	Bangalore, Karnataka
21.	National Institute of Pharmaceutical Education &	Mohali, Punjab

	Research	
22.	Department of Biotechnology, Bharathiar University	Coimbatore, Tamil Nadu
23.	Department of Biotechnology, Himachal Pradesh University	Shimla, Himachal Pradesh
24.	Devi Ahilya Vishwavidyalaya, Indore	Indore Madhya Pradesh
25.	Aligarh Muslim University	Aligarh, Uttar Pradesh
26.	Department of Biotechnology, Karnataka University Dharwad	Dharwad, Karnataka
27.	Department of Biotechnology, Punjab University	Chandigarh
28.	School of Biotechnology, Banaras Hindu University	Varansi, Uttar Pradesh
29.	Sri Krishnadevaraya University	Anantpur, Andhra Pradesh
30.	Department of Biological Sciences & Bioengineering, Indian Institute of Technology, Kanpur	Kanpur, Uttar Pradesh
31.	Department of Biotechnology, University of Calicut	Calicut, Kerala
32.	Department of Biochemistry, Faculty of Science, MS University of Baroda	Varodara, Gujarat
33.	Department of Biotechnology, Government Science College	Bangalore, Karnataka
34.	Department of Biotechnology, Gulbarga University	Gulbarga, Karnataka
35.	Jamia Millia Islamia	New Delhi
36.	Sree Chitra Thirunal College of Engineering	Thiruvanthapuram, Kerala
35.	Deptt. of Studies in Applied Botany and Biotechnology, University of Mysore	Mysore, Karnataka

LIST OF TOP BIOTECH COMPANIES IN INDIA

Here is a list of best biotechnology companies in India. Apart from domestic companies, there are several MNC's that have opened their branches in India. Future of biotech in India is certainly very bright, but it is very important to graduate from a good institute. There are several newbie institutes offering even PHD in biotechnology, microbiology, genetics etc .. students should carefully talk to existing students of the college, check placement history, facilities and qualifications of professors before opting for one.

Some of the best Biotech Companies in India are as follows.

1.Biocon,
Bangalore,Website: http://www.biocon.com
2. Serum Institute of India,
Pune,Website: http://www.seruminstitute.com
3.PanaceaBiotech
New Delhi, Website: http://www.panacea-biotec.com
E-mail:corporate@panaceabiotec.com
4.PiramalHealthcare
Mumbai,Website: http://www.piramalhealthcare.com/
5. Wockhardt Limited
Mumbai,Website: http://www.wockhardt.com
6.GlaxoSmithKline
Mumbai,Website: http://www.gsk-india.com/
7. Bharat Serum
Mumbai,Website: http://www.bharatserums.com/index1.htm
8. Krebs Biochemicals and Industries Limited
Hyderabad, Website: http://www.krebsbiochem.com/
9. Zydus Cadila

Ahmedabad, Website: http://www.zyduscadila.com/
10. Indian Immunologicals
    Hyderabad, Website: http://www.indimmune.com/
11. Monsanto Biotech
    Mumbai, Website, http://www.monsantoindia.com/
12. Rasi Seeds
    Attur (TN), http://www.rasiseeds.com
13. Venkateshwara Hatcheries
    Pune, http://www.venkys.com
14. Novo Nordisk
    Bangalore, http://www.novonordisk.co.in
15. Indian Immunologicals
    Hyderabad, http://www.indimmune.com/
16. TransAsia Biomedics
    Mumbai , http://www.transasia.co.in/

Other companies

Astrazeneca India, Brainwave Bioinformatics, Bangalore Genei, Avesthagen, Centre for Cellular and Molecular Platforms, GVK Biosciences, Indian Immunologicals Limited, Intas Biopharmaceuticals, Nuziveedu Seeds Private Limited, Reliance Life Sciences, Shantha Biotechnics, Strand Life Sciences and VAV Life Sciences Sisco, Care Biomedicals.

POTENTIAL ENTREPRENEURSHIP ACTIVITIES IN BIOTECHNOLOGY

Asia is experiencing a surge of bioentrepreneurship—the result of a heady combination of political will regionally and powerful industry drivers globally. As a consequence, there has been a proliferation in the number of biotechnology start-ups all over Asia. Knowledge industries in Asia are nascent and thus, the governments are driving numerous initiatives to build and provide incentives to this sector .Government funding in the form of grants, benefits, incentives and tax breaks is a prominent feature throughout Asia. The surge in the development of Asian biotechnology is also aided by global opportunities and events. There are potential pitfalls, however. One is a lack of scientists and scientific business managers. In India The level of entrepreneurship is relatively high. Measured by the prevalence of new firms, or the percentage of people working in their own firms, India shows a level of entrepreneurship greater than that observed in countries such as France, Germany and Israel, and similar to that of Australia. Biotechnology is one of India's fastest-growing industries. There are several government agencies that fund and support biotechnology, but the Department of Biotechnology (DBT), which was set up in 1986, remains the nodal agency that is solely dedicated to the sector. Regulation of all biotechnology work and assistance of various institutions and organizations by funding research projects and issuing regulatory guidelines in India are its functions. In Australia, biotechnology research covers a broad spectrum of areas including medical devices, biomedicine, agricultural biotech and diagnostics. The government is instrumental in promoting the industry; its National Biotech Strategy provides direction and educates the public about biotechnology ventures and products. The government has also been active in providing grants for new biotech ventures. One such initiative is addressing the critical funding gap between the research and commercial development stage (the pre-seed stage) and aiming to foster a large number of new Australian biotechnology companies by part-funding proof-concept activities are the functions of Biotechnolgy Innovation Fund (BIF). Singapore's drive shows healthy signs of growth. Nowhere is the term 'long-term commitment' more ingrained than in the tiny island state of Singapore, where industries such as chemicals, electronics and engineering

have been masterminded from the ground up and remain firmly planted as the country's key economic engines. To encourage the formation of new ventures and attract scientific talent to expand the biotechnology industry, Singapore has gone beyond simply building its robust base of multinationals. Partnerships between industry and local research institutes, hospitals and universities are encouraged to spur innovation among local researchers and to help foreign companies secure a foothold in Asia using Singapore as a gateway. Singapore is rapidly building its human capital pool to meet the growing needs of the biomedical science industry. Public scientific awareness campaigns and educational programs will expand the local talent pool. Thailand has woken up to the opportunity for developing its biotech industry and has begun to launch serious initiatives. As the market for biotech products continues to expand, many organizations are helping to stimulate the industry in Thailand by providing consultancy services to industry, conducting contract research, and promoting the commercialization of research results. BIOTEC, for example, has undertaken a number of commercial ventures with overseas companies and has taken the lead in setting up a number of joint ventures with the Thai private sector. As agriculture is the basis of the economy, agbiotech is the most developed and practiced technology, with goals of improving crop quality and increasing output. Current research has focused on producing high-quality rice that is more resistant to diseases and produces higher yields. Also, in aquaculture, biotechnology is used to develop testing methods to prevent epidemic diseases in prawn domestication, improve breeds to meet the market demand, and create breeding stock for farming. Thai physicians and medical researchers are highly capable and can be regarded as one of the country's strong points in medical science and public health sector. Thailand is encouraging the application of biotechnology in the manufacturing sector, while considering the social implications and impacts on quality of life in commercializing these medical products. Medical products that are now being developed and have commercial potential include clinical test kits for amphetamines, tuberculosis, cholera, and melioidosis; vaccines for dengue hemorrhagic fever and leptospirosis; and anti-malarial and anti-
tuberculosis drugs [4].

SELECTION OF INDIA FOR BIOTECH INDUSTRIES

First, an inventory is made of a biotechnology data collection in India. This will include an assessment of how the need for biotechnology related statistics is being addressed, mainly in terms of patent data, commercialisation of genetically modified organisms, R&D allocations for biotechnology and industry statistics. In general, limited efforts have been made by different Indian agencies to collect statistics on biotechnology. One of the reasons for this scarcity of statistics is a missing consensus in India on a definition of biotechnology. However, initiatives are underway to address this and to establish a measurement framework.

• To address the current lack of focus, India needs to establish a mechanism that will help to set priorities in the R&D work programme of various public laboratories and departments. India needs to adjust the human resource policy according to these research priorities.

• There is a large number of agencies dealing with biotechnology, which has led to duplication of research funding and a lack of co-ordination. This needs to be addressed urgently.

• Once core areas of competencies have been identified, efforts need to be undertaken to attract star scientists back to the country.

• Small and medium-sized enterprises need more support to face the intense competition from multinationals.

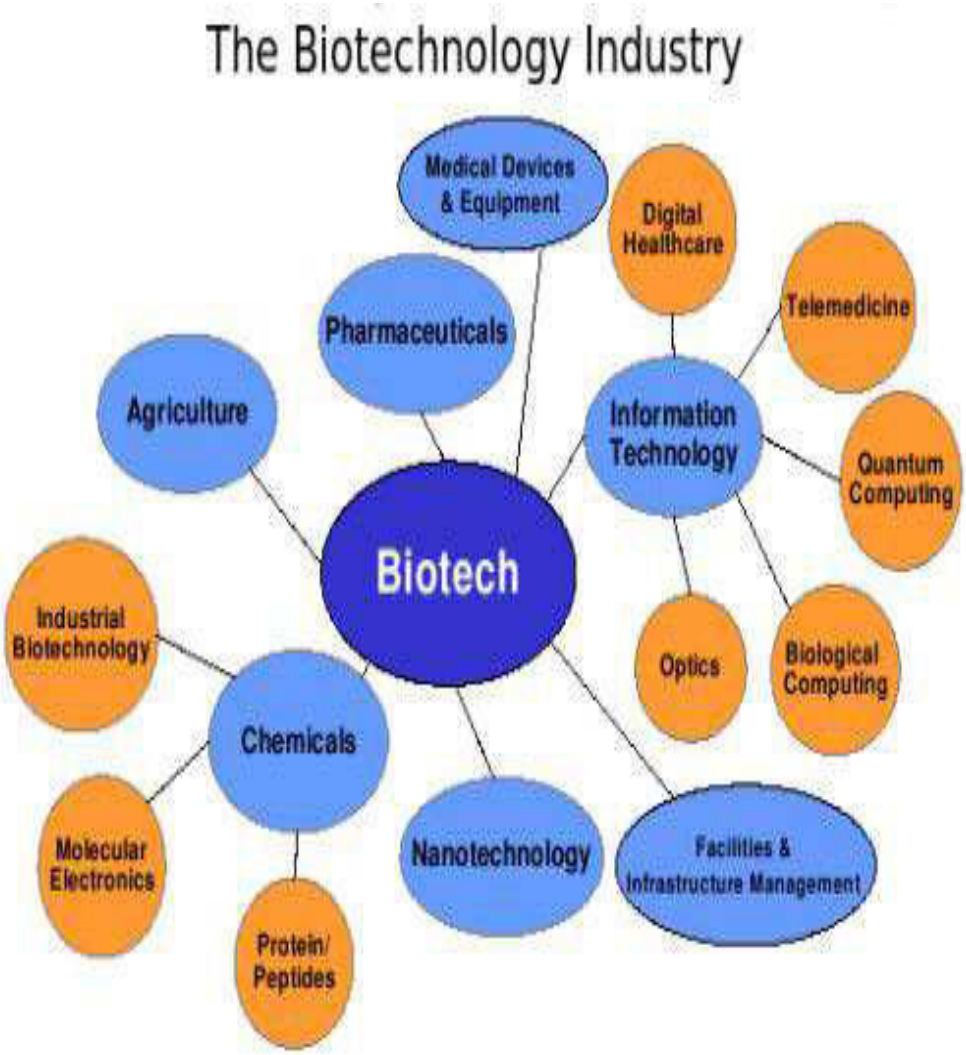
• Policies need to be developed or articulated better to deal with various technology inherent and technology transcending risks.

• The Department of Biotechnology (or another relevant agency) should urgently initiate an data collection exercise, especially concerning data on biotechnology related allocations at the individual institute/laboratory level and on patent data using International Patent

Classification details. It is also important to evolve a consensus among agencies on the definition of biotechnology. Lessons can be learned from the experience of OECD countries. However, specific policy thrusts in India need to be kept in mind, such as nutritional security and indigenous technological efforts.

• India should tap the complementarities that exist both at the regional and sub-regional level in Asia for the collective advancement both in terms of establishing a physical infrastructure and in terms of an evolving common approach to policy issues. A forum like the Asian Co-operation Dialogue may help in achieving this.

• In light of these conclusions, it is important that India comes out with a comprehensive national policy to balance national socio-economic priorities with adequate technological expertise. Such a policy may also provide an overarching framework for regulatory issues, which may help in strengthening not only the process of inter-ministerial co-ordination but also in accommodating expectations of various state governments.



PRODUCT DEVELOPMENT AND MARKETING

Products and services that are derived from biotechnology has been the driving force behind the establishment of biotechnology companies. For the pharmaceutical sector, these products include recombinant vaccines, hormones, vitamins and antibiotics. In plant biotechnology, engineering for insect and disease resistance, as well as storage protein and other nutritional improvements has been the trend [5]. To evaluate accurately a new

biotechnology, an entrepreneur must account for the future revenue from the final product, the cost and time needed to get the product to market, and the various risks faced along the way. Entrepreneurs can approach the venture community with a more rational basis for investment by expressing a biotechnology in terms of risk-adjusted net present value (*rNPV*), as discussed here. Investments, milestone payments, clinical trial costs, and royalties on sales can then be compared directly using the common currency of *rNPV*. A researcher has made a scientific breakthrough that could be worth millions of dollars. To attract the investment needed to commercialize the biotechnology, the researcher must now convince venture capitalists and pharmaceutical companies of its potential. However, investors want to know what the biotechnology is worth today and will require evidence to substantiate this estimate. Unfortunately, estimates of the value of a biotechnology are all too often clearly unrealistic. "Valuations" are typically made in the following (unrealistic) manner: "The market for our product is $2 billion per year, so if we capture only 10% of that market for 10 years, then the company is worth $2 billion today, less development costs." Perhaps as a result, the venture capital community often judges a company on the basis of its management's expertise rather than the underlying asset of real value—the biotechnology.

Using the *rNPV*, the inventor and investor can arrive at a realistic value of a biotechnology (see Fig.). By adopting an auditable valuation approach, biotechnology companies may be able to seek debt financing even at early R&D stages. However, as Steven Burrill, chief executive officer of Burrill & Company (San Francisco, CA) cautions:"Notwithstanding all the fancy math, the real way these tech companies are valued is based on comparables ... the real value is determined on an arm's-length negotiation." Even so, knowing the underlying value of a biotechnology can be critical for getting the best deal from either side of the negotiation table. The same applies when buying or selling a house: You get the best deal when you know the house's value based on an accurate appraisal. Likewise, you can set an advantageous price by knowing the fair value of the biotechnologies—the *rNPV (risk net present value)*. Simplistic cash flows (in red), which include revenue and costs, present unrealistically high valuations for biotechnologies. A better representation is the net present value (*NPV*; in green), which discounts the revenue cash flow over time, but even the *NPV* overestimates the value of biotechnologies during all R&D stages. Risk is mitigated as biotechnologies progress through development. When this increasingly mitigated risk is taken into account, the risk-adjusted cash flow can be discounted to arrive at the risk-adjusted *NPV* (*rNPV*; in blue). The *rNPV* is an estimate of the fair price of a biotechnology. Note that *rNPV* coincides with *NPV* only once risk is mitigated [6].

INDUSTRIAL LICENSING

Licensing has been an integral part of commercial biotechnology since its inception. In 1978, at the very beginning of the biotechnology industry, Genentech (S. San Francisco, CA) licensed its first therapeutic, recombinant insulin, to Eli Lilly (Indianapolis, IN). Six years later, Amgen (Thousand Oaks, CA) entered into a deal with Kirin (Tokyo, Japan), selling its rights to the drug erythropoietin in Japan. Such licensing agreements helped to pave the way for a dominant and continuing trend within biotechnology—growth though sophisticated collaborations with other biotechnology or pharmaceutical companies. Indeed, by the late 1990s, biotechnology companies were entering into alliances with pharmaceutical partners in unprecedented numbers. Between 1990 and 1998, the top 20 pharmaceutical companies invested approximately $21 billion in collaborations with biotechnology companies, and between 1996 and 2000 the number of alliances had increased to an average of 616 a year. Collaborations offer biotechnology companies access to resources that they often lack, such as regulatory expertise and manufacturing and marketing capabilities. In return, pharmaceutical companies gain access

to emerging technologies, proprietary products, and the bright minds behind them. It has proved a highly successful relationship, resulting in biotechnology product sales of $39 billion and a growing pipeline of new products.

With so much at stake, is there a way to gauge how the value of a licensing deal is identified, enhanced, and captured? Do we know what drives the value of a deal? Although no shortage of opinion within the industry exists on this topic, there is little published analysis. Here we set out to find the answer to these key questions. The licensing agreements between biotech and pharma, initially generators of value, can in the event of failure, have a dramatic impact on the biotech. In 2003, at the time of the announcement by AstraZeneca that the compound in-licensed from the NicOx company in phase II (AZD3582), had not met the necessary criteria to pass into phase III, the quotation of NicOx' shares was suspended. With the removal of suspension two days later, the NicOx share plummeted 83.67 %! As we saw, the licensing agreements strongly evolved/moved. In this context, the factors playing a great part in the success and the development of an agreement are as follows: timing, the choice of partner and the evaluation of the value of a licence. As we saw previously, recent changes deeply affected the licensing agreements. This rise of biotech companies' power was not fortuitous. It rises from their high degree of innovation, their diversity and technology employed. In this context, the pharmaceutical companies were born from new entities, sometimes forcing their company philosophy upon the biotech companies and especially affecting their hegemony. Moreover, the arrival of "generics" (Teva, Sandoz, etc) contributed to accentuate the competition for the acquisition of molecules from biotech companies. This fratricidal conflict resulted in a value increase of early stage molecules and thus in an increase of financial risk. In this context, use of the methods to evaluate new projects was spread little by little in the industry to estimate this risk. Today, the NPV is largely used supported by more complex methods (decisional trees, real options). This is undoubtedly more refined when considering the random aspect of the molecule development. Lastly, the accession of the data mining will undoubtedly bring more definite answers, by the integration of multiple parameters simultaneously[8].

GOVERNMENT POLICIES FOR BIOTECH INDUSTRIES

Sector Overview

The biotechnology sector is one of the country's major sectors. As per the Association of Biotechnology Led Enterprises (ABLE), the sector was estimated at around USD 4 billion in 2011. Various estimates suggest that the sector is poised to increase to USD 10 billion by 2015. India is amongst the top-12 biotech destinations in the world and ranks second in Asia, after China. It is also the largest producer of the recombinant Hepatitis B vaccine in the world. The Indian biotechnology sector is presently divided into five segments of bio-pharmaceuticals, bio-services, bio-agriculture, bio-industrial and bio-informatics. Bio-pharma accounts for 60% of total revenues in the biotechnology sector, followed by bio-services at 20%, bio-agri at 14%, bio-industrials at 4% and bio-informatics at 2%. Revenues from biotech exports were USD 1.57 billion in 2009–2010, constituting 52% of the biotech industry's total revenues. Data obtained from the Department of Industrial Policy and Promotion (DIPP) shows that the drugs and pharmaceuticals sector attracted an impressive level of FDI worth USD 3,208 million between April 2011 and January 2012. DIPP is a part of the Ministry of Commerce and Industry and is responsible for framing the country's FDI policy.

POLICIY AND PROMOTION

The Indian government has been proactive and supportive in driving the growth of the biotechnology sector by offering grants and tax incentives, and implementing investment-friendly regulations. FDI up to 100% is permitted through the automatic route for the manufacture of drugs and pharmaceuticals. The Department of Biotechnology (DBT) is the nodal agency for the sector's policy promotions regarding R&D, global cooperation and

manufacturing activity. Towards this end, DBT set up 35 facilities between 2002 and 2007 to produce and supply biologicals, reagents, culture collections and laboratory animals to scientists, industries and students at nominal costs.

The government has taken several initiatives to promote the growth of the Indian biotechnology sector. Some of these are:

- **Biotechnology Regulatory Authority of India**: The Indian government has proposed the setting up of this authority by drafting the Biotechnology Regulatory Authority of India Bill, 2011. This authority is aimed to be set up as an independent body and legal committee to control the production, research, transport, import, and usage of organisms and products of modern biotechnology.
- **Biotechnology Industry Research Assistance Council**: This council has been set up to support innovation and provide infrastructure and services to the Indian biotechnology sector. It will also address sector needs by providing a suitable environment to promote and support high-end innovation.
- **Venture Fund**: The Indian government has set up a USD 2.2 billion venture fund for supporting drug discovery and research infrastructure development projects. This is a crucial step as it increases the funding required for innovative work by the Indian biotech sector.
- **Clinical Establishments Bill**: The Indian government passed the Clinical Establishments Bill in the year 2010. This move is aimed at standardizing procedures for various clinical trial-related tasks. The bill aims to make registration of clinical trials, as well as clinical research organisations, mandatory throughout India.
- **Food security plan for sustainable crop production research for international development**: The Government of India has undertaken this initiative with the specific aim of increasing global partnerships between India and the UK in the field of biological and biotechnological research.

Major Players

South India, with biotech hubs such as Bangalore in Karnataka and Hyderabad in Andhra Pradesh, represents the biggest hub for biotech companies. The number of biotech companies in South India was 172 in 2010. In fact, almost half of the biotechnology companies in India are based out of the state of Karnataka. Apart from Karnataka, states such as Andhra Pradesh, Maharashtra, Tamil Nadu and Kerala have been proactive in supporting the biotech sector by establishing world-class biotech parks and clusters. A total of 350 companies operates in the biotechnology sector in India. Some of the successful biotechnology companies in India are Biocon, Serum Institute of India, Panacea Biotech, Panacea Biotec, Nuziveedu Seeds, Reliance Life Sciences, Quintiles, Rasi Seeds, Novo Nordisk, Shantha Biotechnics, Venkateshwara Hatcheries, Indian Immunologicals, TransAsia Biomedics and Mahyco. Foreign players are also establishing their presence in the Indian biotech space. For instance, Denmark-based global biotech company Novozymes has partnered with Bangalore-based biotech company Sea6 Energy in January 2012 for exploratory research and to jointly develop a process for the production of biofuels from seaweed. Novozymes has planned to provide research, develop and manufacture enzymes for the conversion process, while Sea6 Energy will contribute its offshore seaweed cultivation technology. Lonza, a global leader in the production and support of pharmaceutical and biotech products, is planning to set up a manufacturing base in India at an investment of USD 150 million at Hyderabad. In a similar move, India-based Clinigene International, a subsidiary of Biocon, and Seattle based Pacific Biomarkers Inc. (PBI) announced a collaborative agreement in January 2012 to address the specialty biomarker and high-end clinical trial laboratory needs of the global pharmaceutical and biotechnology industry. Clinigene offers end-to-end clinical and laboratory services for accelerating clinical research and PBI provides premier biomarker and specialty efficacy testing services to the

drug development industry. This partnership with Clinigene provides PBI access to India, an emerging hub for drug development and contract research.

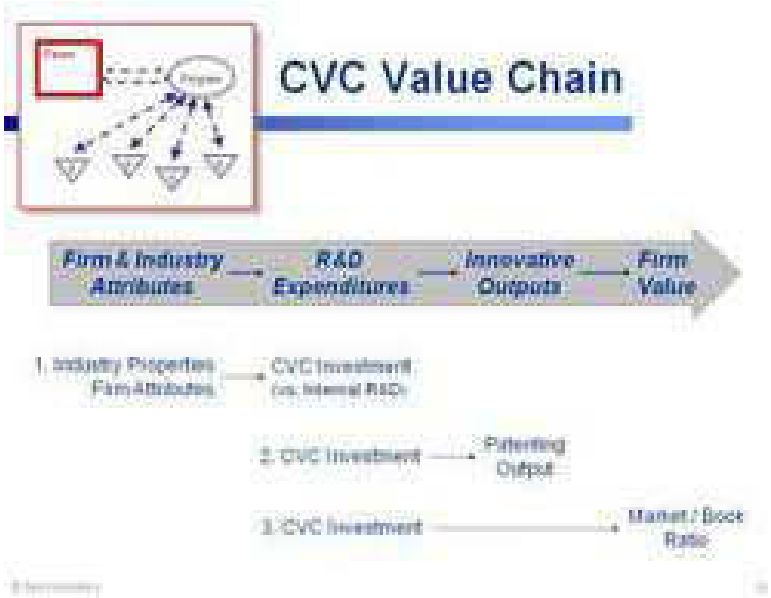
Sector Outlook

The biotechnology sector is expected to offer huge investment opportunities in the coming five to 10 years in the areas of vaccines, bioactive therapeutic proteins, contract research, clinical trials, bioinformatics, medicinal plants, animal biotechnology, seri biotechnology, stem cell biotechnology, bio-fuels, bio pesticides, bio-informatics, human genetics and environmental biotechnology. The Indian biotechnology industry is expected to garner revenues of USD 11.6 billion by the year 2017. Rising investments from foreign companies, increasing R&D and infrastructure investments from the private and public sectors, emerging market for contract research, increasing clinical capabilities in drug discovery and rising opportunities to outsource manufacturing functions to the country are the key factors driving this market growth. The Indian biotechnology sector presents various advantages in terms of a lucrative return on investment. Some of these advantages are:

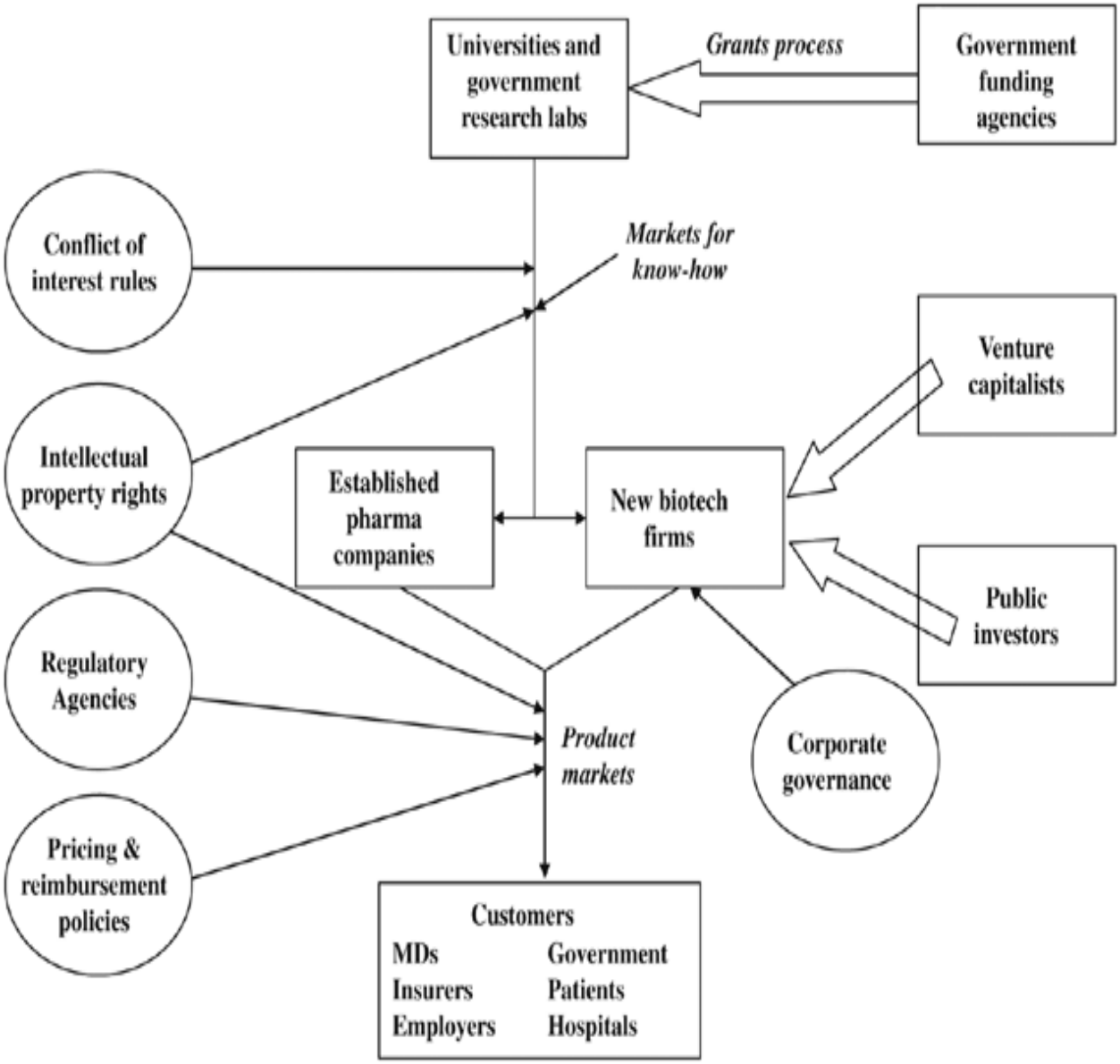
- **Structural advantages**: India's billion-plus population base offers a huge market for biotech products and services. Moreover, rising purchasing power fuels demand for healthcare services. India is experiencing an expanded middle-class population, and this segment's size is estimated to touch 550 million by 2025 from 50 million in 2010.
- **Low labour cost**: India offers a low-cost and skilled labour force, which is a key reason for the country attracting outsourced research activity from global biotechnology companies.
- **R&D investment by biotech firms**: Biotech firms are increasingly using India as a base to undertake focused research and development activities. This is also aided by rising government funding for product innovation and research in the biotech sector.

VENTURE CAPITAL

A venture capitalist must be able to successfully integrate information from a wide range of disciplines to quantify the risks associated with business proposals and their potential for value creation. The role of venture capitalists in the health-care industry is to provide financing and guidance to companies with promising technologies and products. Investments are typically designed to fund through one or more important milestones, such as a clinical trial or product launch, that will drive value in either the public markets or the eyes of acquirers. While the level of involvement in portfolio companies varies from firm to firm, Thomas, McNerney & Partners tends to be an active investor. For example, the team member who leads each investment nearly always takes a seat on the board of directors and has a hands-on role supporting entrepreneurs in building the company. In addition, many venture capital firms like ours routinely start companies from scratch, which can involve a lot of heavy lifting, such as licensing of technology from a university or spinning assets out of an existing company, developing a business plan and budget, setting up operations and hiring full-time managers. Other times, we invest in companies with well-established operations and a business plan in place. In either case, a good venture investor does not just provide capital, but uses his or her knowledge, experience and network to help the company achieve success[8]. Corporate venture capital (CVC) programs raise money not only from the corporations' internally generated cash but also from outsiders and invest it in entrepreneurial start-ups at all stages of development. As a group, the corporate venture capital industry mirrors the venture capital industry, with funds specializing by stage of development and industries.



The distribution of venture capital investment by industry for both independent and corporate VC investors is quite similar for independent venture capital and corporate venture capital programs. The life sciences industry receives the highest percentage of venture capital funds, with approximately 25% allocated to portfolio companies focused on the life sciences. This is followed by computer hardware, computer software and online services, and communications. some players have shifted their corporate VC programs towards the support and development of these complementary network nodes to shape the industry to their view, which ultimately support the success of their new technologies. For example, Intel Capital has created two funds: Intel 64 and Intel Communications fund with this objective in mind. Yet, despite these multiple but straightforward objectives of CVC programs, many corporations have still been very frustrated. Indeed, a recent Bain study showed corporate venturing as one of the least applied and least satisfying strategic programs used (Bain, 2001)[9].



This figure shows the Building a conductive environment for life science-based entrepreneurship and industry clusters[10].

CONCLUSION

Biotechnology is now one of the hot areas driving the stock markets as well as a frontier of knowledge and job creation. Just as the provision of research grants is a major issue, entrepreneurship and financing for biotechnology companies should also be high on government policy and educational agenda. Biotechnology can only be entrenched in developing countries with the establishment of a strong research base and entrepreneurial culture. Developing countries' scientists who summon enough courage to take part in these ventures will become part of the business elite of the future. Finally, any country that can assist its scientists and entrepreneurs in successful biotechnology start-ups will enjoy economic growth. A biotech entrepreneur may not initially possess every skill required to lead a talented and diverse team to build a successful business, however, as with any skill set, most can be learned if the entrepreneur is willing. Once these skill sets are acquired and

proficiency is gained, these entrepreneurs generally go on to start many other biotech companies. These serial entrepreneurs successively build upon each previous learning experience and become proficient at their work and at recognizing the critical components of a successful business opportunity. Whether someone seeks to start or join a company at any stage of development, a good analogy for building a biotech company is to realize that every great architectural structure we see today was first conceived in someone's mind.

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