

Report commissioned by
Department of Information
Technology (IT),
Biotechnology (BT), and
Science and Technology (S&T)

Government of Karnataka
FEBRUARY, 2014

KARNATAKA

The Biotech Hub of Asia

 **ABLE** Association of
Biotechnology
Led Enterprises
The collective face of the Indian Biotech Industry

 **CMR**
Insights powered by research

BioSpectrum the business of bioscience



KARNATAKA

The Biotech Hub of Asia

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Executive Summary

Introduction

Karnataka has been at the forefront of biotechnology in India and is rightly known as the Biotech Capital of India. Karnataka is home to a large array of biotechnology enterprises, including large companies, medium-sized ones, and many promising biotech start-ups.

Karnataka leads the Biotechnology domain in India due to its strong ecosystem and rich tradition of education and biotechnology training. Karnataka is home to many nationally and internationally renowned biotechnology research institutions including, the Indian Institute of Science, National Centre for Biological Sciences, NIMHANS, Jawaharlal Nehru Centre for Advanced Scientific Research, Central Food Technological Research Institute (Mysore), Kidwai Memorial Institute of Oncology, Manipal Institute for Neurological Diseases, Rajiv Gandhi University of Health Sciences and the University of Agricultural Sciences.

Karnataka has around 82 engineering colleges, 23 medical colleges, 46 pharmacy colleges, almost 200 polytechnics and 300 industrial training Centres. Karnataka is establishing a Biotech Corridor, extending from the Indian Institute of Science (CV Raman Road) to the University of Agricultural Sciences (GKVK Campus), for the development of biotech industry in the state.

Being the pioneer of the biotechnology industry, Karnataka has built up considerable resources and talent pool that are well suited for the needs of the industry. With a view to give further impetus to boost biotechnology in Karnataka, the Government of Karnataka unveiled the Millennium Biotechnology Policy II in 2009, replacing the earlier policy statement of 2001. The new policy outlined steps to further enhance the development of

biotechnology industry and harness its benefits for the common citizen. The policy offered a number of additional fiscal incentives and concessions. Apart from rebate on stamp duty and exemption of entry tax, electricity duty, and industrial power tariff, there are additional incentives like investment promotion subsidy, waiver of conversion fine, subsidy for effluent treatment plants (ETPs), interest-free loan on VAT, anchor unit subsidy, interest subsidy, and financial support towards patent registration, standardization, water conservation, and energy conservation. As a focus area, the policy makes special commitments in the area of biofuels. Karnataka has set a goal to meet 20 percent of its fuel needs from biofuels by 2020.

Millennium Biotech Policy Highlights

- ➔ Bio-venture fund of ₹50 crore in partnership with professional VC firm
- ➔ Unique package of concessions for Mega projects
- ➔ Fiscal incentives and concessions under Karnataka Industrial Policy 2009-14 being extended
- ➔ Research labs to automatically come under green category
- ➔ Biotechnology (BT) finishing schools to equip students with necessary employable skills to make them industry ready
- ➔ Five Biotech parks being established in different parts of the State
- ➔ Animal quarantine facility near Kempegowda International Airport
- ➔ Bio-IT facility in Institute of Bioinformatics and Applied Biotechnology (IBAB).
- ➔ Encourage the growth of bioinformatics in Karnataka
- ➔ Create awareness about investment opportunities in biotechnology, genomics, biofuels, bioinformatics, contract research, etc., among the entrepreneurial community
- ➔ Incentives and concessions for the biotechnology industry to attract investments to the state.

Some of the key highlights of the current Policy include the following:

Single window clearance for biotechnology projects

A Single Window Clearing Mechanism is available to clear all projects of the biotechnology industry. The agency will follow up both in principle and actual sanction by the respective departments and will be serviced by the Karnataka Biotechnology and Information Technology Services (KBITS).

Intellectual property and innovation management

To promote Intellectual Property Rights (IPR) and innovation, the Karnataka Biotechnology Council will develop a comprehensive database on patents, with on-line processing. It will establish an exclusive cell to advise entrepreneurs on how to file patents and how to protect IPR. The cell will actively interact with the National Law School, will produce publications for use of entrepreneurs, will conduct seminars, and will advise companies on IPR management.

Incentives

- ➔ Patent and product registration: Financial assistance to biotechnology industries for patent tracking and registration up to 50 percent of registration cost, subject to maximum of \$4,167 and provided that patent/intellectual property right is recognized
- ➔ Standardization certification: Financial assistance to biotechnology industries for standardization certification up to 50 percent of certification cost, subject to maximum of \$4,167. Assistance includes expenditure incurred towards cost of acquiring equipment required for testing and certification, quality upgrade and consultancy, etc.
- ➔ Biotech industries and R&D Centres will be subject only to three zonal classifications under the industrial policy, with industries in zonefour sharing the same incentives as those in zonethree.

Intellectual capital development

With a intent to build and better equip the scientific workforce in Karnataka to tap the new integrated disciplines in Biotechnology, Karnataka has taken steps to develop the human resources. Karnataka has several universities and other research institutions offering advanced degrees in areas of the biological and physical sciences. However, these courses are specialized and need to be upgraded to equip students with training in modern as well as integrative aspects of biology.

Bio-venture fund

Karnataka has set-up a bio-venture fund, with a corpus of \$10.4 million, in partnership with professional venture capital firms. The state will give 26 percent of the fund and the remaining 74 percent will be raised from venture capitalists. It has also set up a corpus fund of ₹20 crore to facilitate grant of ₹20 lakh each, for enabling commercialization of research results. Besides the state government's support, the industry has the advantage of the presence of a strong investor community/venture capitalists like i2India Ventures, Canbank Venture Capital, and KITVEN Fund in the state.

Biotech parks

The first Biotech Park is being established on the campus of the University of Agricultural Sciences, Bangalore. About 30 acres of land will be handed over to the Department of Information Technology and Biotechnology for this purpose. This international standard park will have well-known R&D institutions, biotech companies and incubation facilities. The entire management of the park will be under the guidance of the Vision Group on Biotechnology. The Department of Information Technology and Biotechnology will establish another biotech park in the Karnataka University, Dharwad, where about 15 acres of land shall be made available. The Department of Fisheries/ University of Agricultural Sciences, Dharwad, will establish a Marine Biotech Park at Karwar for promoting research in Marine Biotechnology.

Concessions for biotech parks

- ➔ Exemption on payment of Entry Tax on machinery, equipment, capital goods and construction materials
- ➔ Up to 50 percent exemption from the payment of stamp duty and registration charges
- ➔ In case of first lease, as well as a subsequent lease of biotechnology companies, concessions will be available for biotechnology parks certified by the Department of IT and Biotechnology. Such parks should have a minimum built up area of 50,000 square feet.

Karnataka is taking strident steps in the domain of biotechnology and is taking strategic policy initiatives to keep the impetus going for sector's growth in the state.

As home to the biotechnology industry and a thriving start-up and research community, Karnataka is poised to keep growing with rapid pace. As the biotech hub of Asia, Karnataka is well-prepared to handle the next wave of biotechnology growth in the region.

Executive summary

Introduction

The biotechnology sector is one of the country's major sectors. In 2011, the biotechnology sector was estimated at around \$4 billion, and estimated to increase to \$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 percent of total revenues in the biotechnology sector, followed by bio services at 20 percent, bio agri at 14 percent, bio industrial at four percent and bio informatics at two percent. Revenues from biotech exports were at \$1.57 billion in 2009–2010, accounting for 52 percent 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 \$3.3M between April 2011 and January 2012.

Over the years, the biotechnology sector has evolved. Earlier, the industry was fragmented, nascent, struggling, and was striving ahead in hope to tap a new emerging opportunity. Biocon with ₹250 crore in revenues was a major player in the enzymes and statins business. Today, it is a fully-integrated healthcare company. Several pioneer companies like Shantha Biotechnics, Wockhardt, and Nicholas Piramal took a course correction during this period and changed priorities. There were no Bt cotton sales that year. The bioagri industry today has revenues of ₹3,050 crore and Bt cotton leader Nuziveedu Seeds entered the club of Top 3 biotech companies for the first time in 2012.

The overall biotech industry in 2011-12 registered 18.5 percent growth recording ₹20,440.70 crore in revenues. The biotech

industry during the last five years has registered a CAGR of 14.75 percent, while during 2002-2007 had a CAGR of 29.5 percent.

South India accounted for 40.70 percent share and registered a growth of nine percent. 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.

A majority of the biotechnology companies in India are based out of the state of Karnataka.

Karnataka- Asia's Biotech Hub

Karnataka, India's biotech capital, is home to over 60 percent of all biotechnology companies in India having a base in Bangalore and driving 50 percent of the total revenues in the national biotechnology sector. It is the destination of choice for global and domestic biotech investments in India.

Karnataka's pharmaceutical sector exports 40 percent of the total pharma produce and accounts for eight percent of the country's total pharma revenue. Karnataka ranks 10th in the number of pharma manufacturing units in the country.

There are some key differentiators that set Karnataka apart in India and Asia:

A. First mover advantage

As one of the first Indian states to focus on biotechnology, Karnataka had a good first mover advantage. With changing times and business environment, the state government realised the need to come up with a new policy to support the biotechnology industry. It announced the Biotech Policy in 2001 and took many policy steps that helped boost Karnataka as a the biotech destination of choice for biotech companies.

B. Strong research base

Karnataka has a strong research base, in terms

of skilled human resources and educational infrastructure. It is home to more than 103 R&D centres. The Government of Karnataka took many innovative steps towards upgradation of skilled resources for the biotechnology sector, as well as initiatives aimed at bridging the gap between industry and academia. In 2013, Karnataka promoted a new concept called Finishing Schools, with the support of Association of Biotechnology Led Enterprises (ABLE), the lobby group for the biotechnology industry; and Vision Group on Biotechnology, with government's financial support of ₹1 crore per Finishing School.

C. Sound infrastructure

Karnataka has a Centre for Cellular and Molecular Platforms (C-CAMP), under the Department of Biotechnology, Government of India. It acts as an enabler of success in bioscience research and entrepreneurship by providing R&D, training and services in state-of-the-art technology platforms. C-CAMP, together with National Centre for Biological Sciences (NCBS) and Institute for Stem Cell Biology & Regenerative Medicine (inStem) form the Bangalore Bio-Cluster. These three entities bring together unique individual capabilities and a shared multi-disciplinary approach to create an interactive bioscience and technology research enterprise.

Karnataka is home to Special Economic Zones (SEZs) focusing on biotechnology and is also home to the largest biotech cluster in India.

Karnataka has proposed to set up a Bio IT park in Bangalore's Institute of Bioinformatics and Applied Biotechnology (IBAB) campus, on a public-private partnership model. The BioIT facility will be a hub for both IT and life sciences organisations, research institutions and academia.

Apart from BioIT facility, the Karnataka government has taken initiatives to set up biotechnology parks across the state, to

encourage the sector's growth. Major projects include, Bangalore Helix, a 106-acre state-of-the-art biotechnology park in Bangalore; Vivarium, an animal house in Bidar; Nutri/Nutraceutical and Phyto/Pharmaceutical Park (N2P2), an institute under the Central Food Technological Research Institute (CFTRI), in Mysore; a Marine Biotech Park in Mangalore; and an Agri-Biotech Park in Dharwad. The parks are scheduled to become operational soon. The government is also promoting the establishment of biotechnology parks by the private sector.

D. Enabling policy framework

The Government of Karnataka provides an enabling policy framework that supports the biotech industry in the state. With a comprehensive Biotech Policy, Karnataka has provided a slew of incentives for the biotechnology industry that includes concessions for biotechnology parks certified by the Department of Information Technology and Biotechnology with a built up area of 50,000 square feet; Financial support of 20 percent of the project cost for public private partnership-based projects for creation of biotech parks; and special concessions for mega projects in biotechnology. Government has provided special funds worth ₹100 crore for manufacturing and a ₹50 Crore R&D corpus fund for biotech companies.

Karnataka has set-up a bio-venture fund, with a corpus of \$10.4 million, in partnership with professional venture capital firms. The State will give 26 percent of the fund; and the remaining 74 percent will be raised from venture capitalists. It has also set up a corpus fund of ₹20 crore to facilitate grant of ₹20 lakh each, for enabling commercialisation of research results. Besides the state government's support, the industry has the advantage of the presence of a strong investor community/venture capitalists like i2India Ventures, Canbank Venture Capital, KITVEN Fund in the State.

On December 9, 2009, Karnataka unveiled its Millennium Biotech Policy II. The new policy outlined steps to further enhance the development of the biotechnology industry, and harness its benefits for the common citizen. The policy offered a number of additional fiscal incentives and concessions. Apart from rebate on stamp duty and exemption of entry tax, electricity duty and industrial power tariff; there are additional incentives like investment promotion subsidy, waiver of conversion fine, subsidy for effluent treatment plants (ETPs), interest free loan on VAT, anchor unit subsidy, interest subsidy, and financial support towards patent registration, standardization, water conservation and energy conservation. As a focus area, the policy makes special commitments in the area of biofuels. Karnataka has set a goal to meet 20 percent of its fuel needs from biofuels by 2020. ■





Biotech Industry overview

Global Biotech Industry

The Global Biotech Industry

The global biotechnology market is expected to attain a growth of 7 percent during 2013-17 reaching nearly \$166 billion in sales by 2017. In 2012, estimates put the global biotech industry revenues for publicly-held companies at \$89.80 billion, an increase from \$80.6 billion in 2010.

The Rise of Asia

As a research hub, Asia is home to a significant slice of the global alliances between biotech and pharma companies, with about 322 global alliances involving a biotech and a pharma company, of which 93 involved at least one Asian country.

India as a Biotech Hub

India in the Biotech Industry

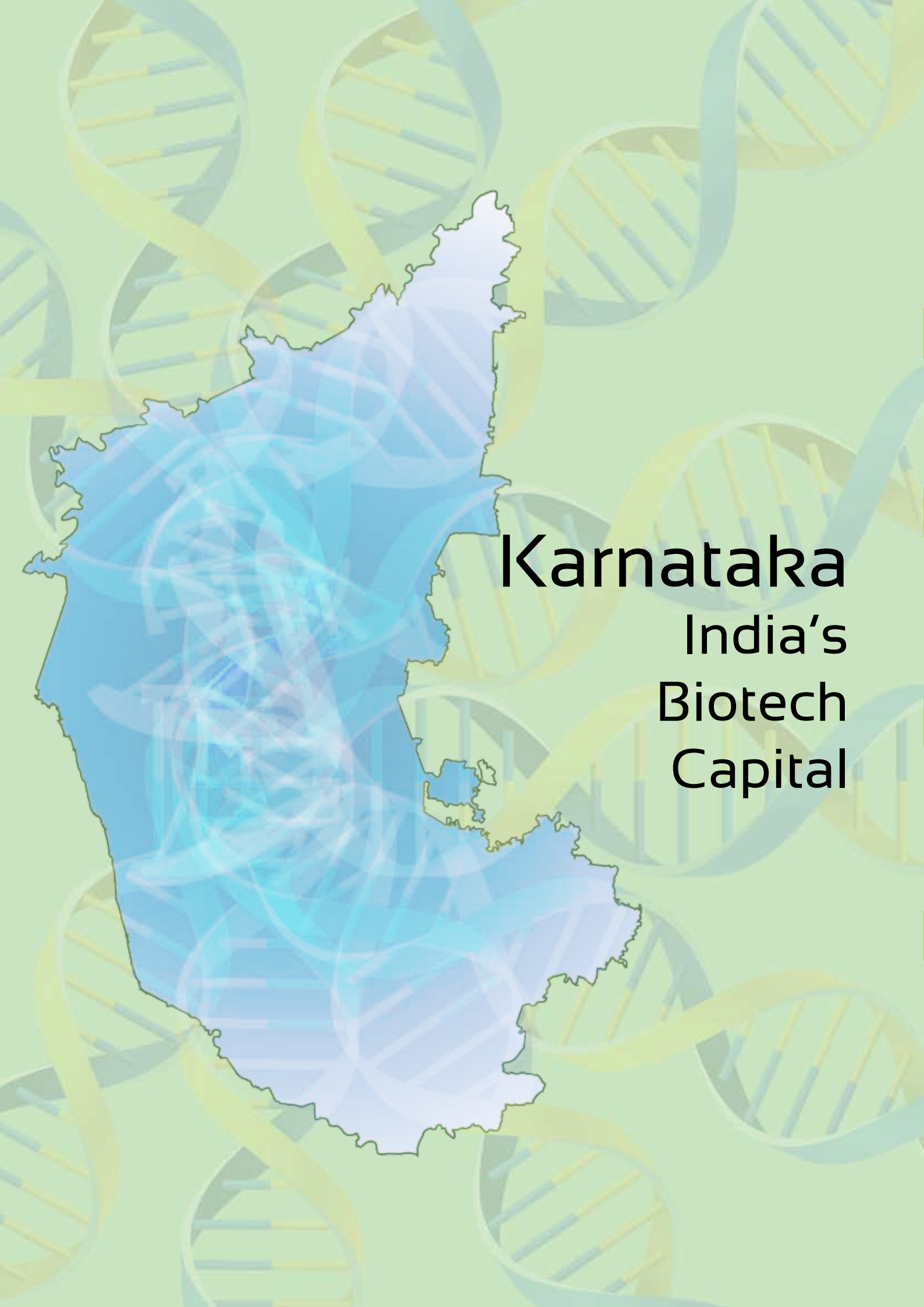
The biotechnology sector is one of the country's major sectors. India is amongst the top-12 biotech destinations in the world and ranks second in Asia, after China.

Emergence of South India

South India accounted for 40.70 percent share and growth of nine percent. 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.

Karnataka- The Biotech Capital of India

Almost half of the biotechnology companies in India are based out of the state of Karnataka. ■



Karnataka

India's
Biotech
Capital

Karnataka – Key Differentiators

Karnataka, India's biotech capital, is the destination of choice for global and domestic biotech investments in India. There are some differentiating factors that put Karnataka ahead of other Indian states.

First Mover Advantage

As a pioneer in the biotechnology sector, Karnataka has adapted to changing times and business environment. The State government has taken strategic initiatives to boost the Biotech Industry.

Strong Research Base

Karnataka has a strong research base, in terms of skilled human resources and educational infrastructure. It is home to more than 103 R&D centres. The Government of Karnataka took many innovative steps towards upgradation of resources for the biotechnology sector, as well as initiatives aimed at bridging the gap between industry and academia.

Sound Infrastructure

Karnataka is home to specialized SEZs focusing on biotechnology and is also home to the largest biotech cluster in India. The Karnataka government has taken initiatives to set up biotechnology parks across the state, to encourage the sector's growth. The government is also promoting the establishment of biotechnology parks by the private sector.

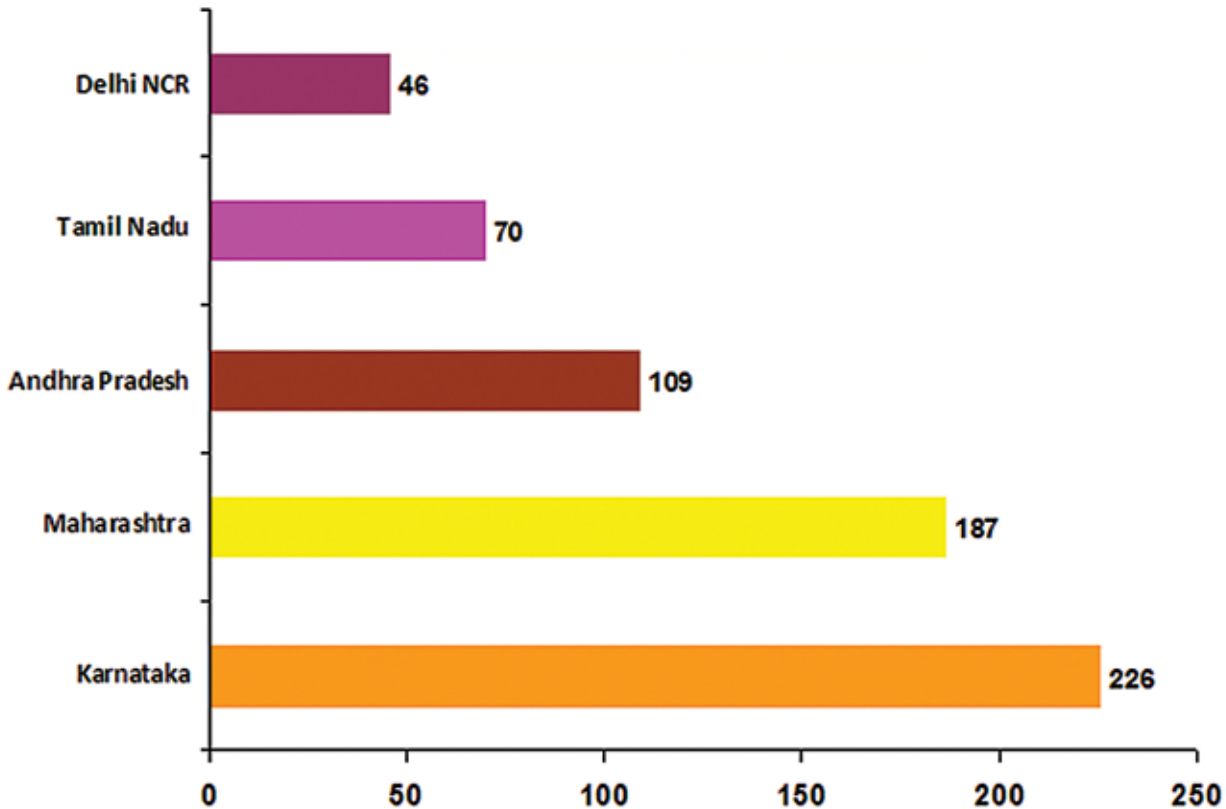
Enabling Policy Framework

The Government of Karnataka provides an enabling policy framework that supports the biotech industry in the state. With a comprehensive Biotech Policy, Karnataka has provided a slew of incentives for the biotechnology industry.

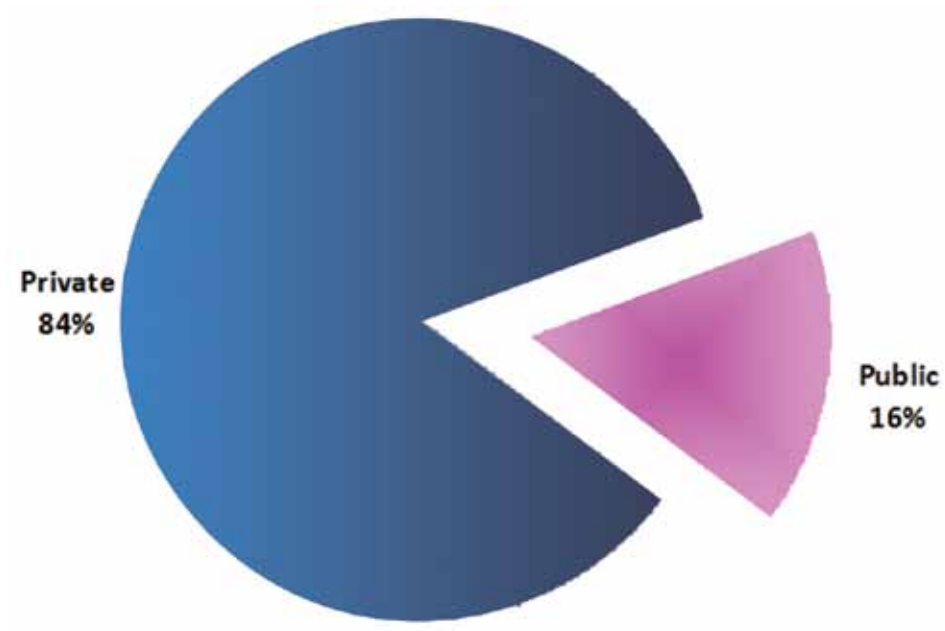
Biotech Industry

Karnataka Vs Other States

Karnataka is home to the largest number of biotech companies in India

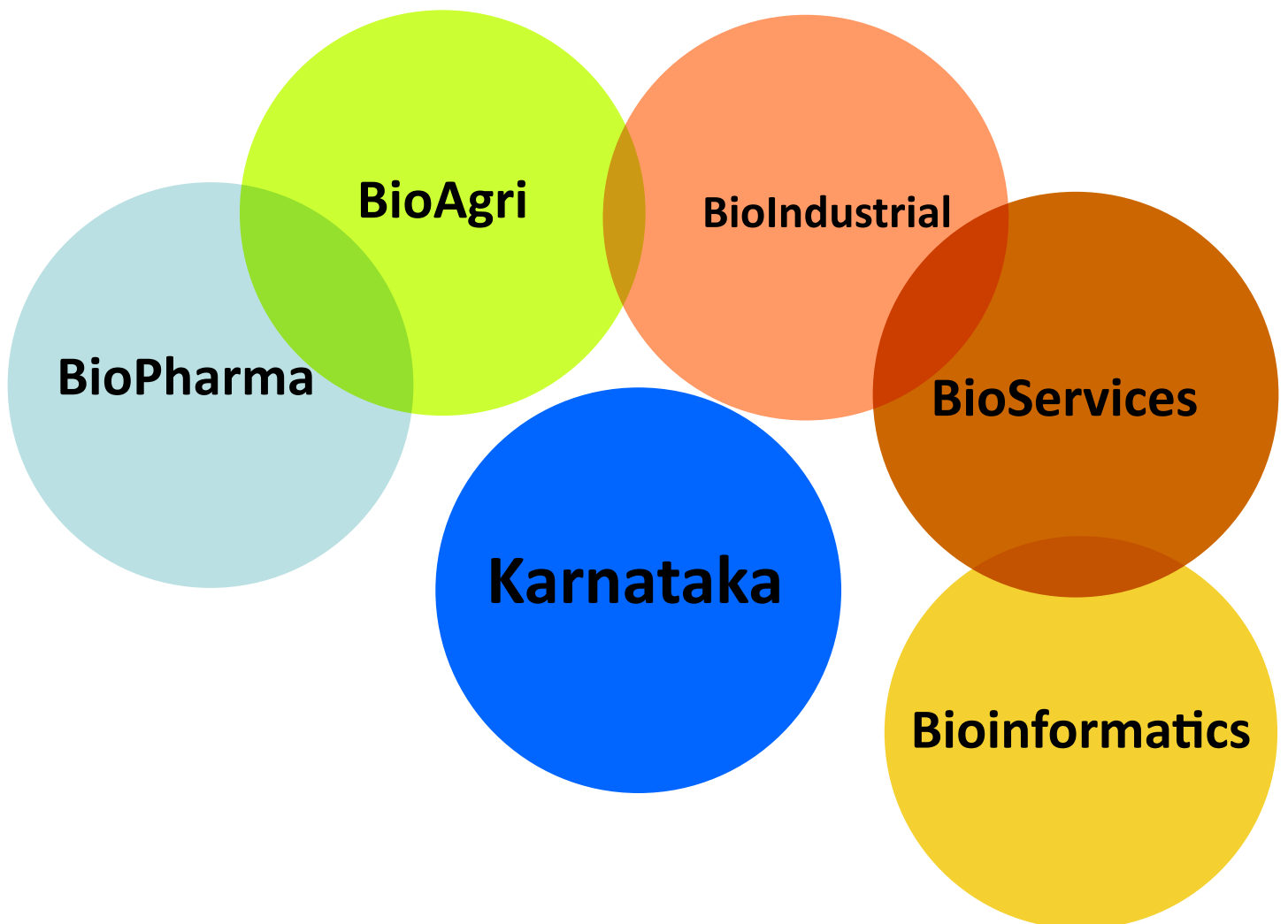


Industry Snapshot



- ➔ Karnataka is home to:
 - A sizable number of biotech MNCs
 - A large number of domestic biotech companies
 - A growing number of promising biotech start-ups
 - Companies supporting LS functions
- ➔ Karnataka is benefitting from a sound ecosystem that has good industry-academia linkages. In addition to the academic ecosystem, initiatives such as BT finishing schools are a good sign for the future

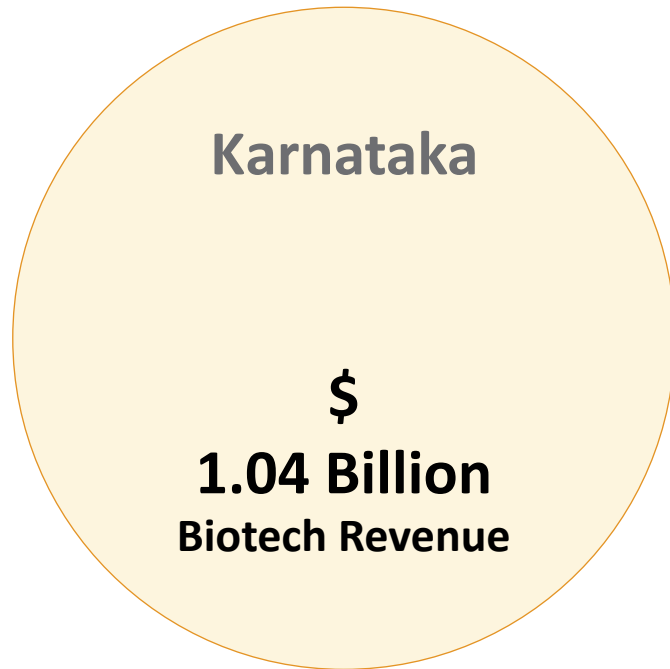
Karnataka Industry Segmentation



Biotech Revenues

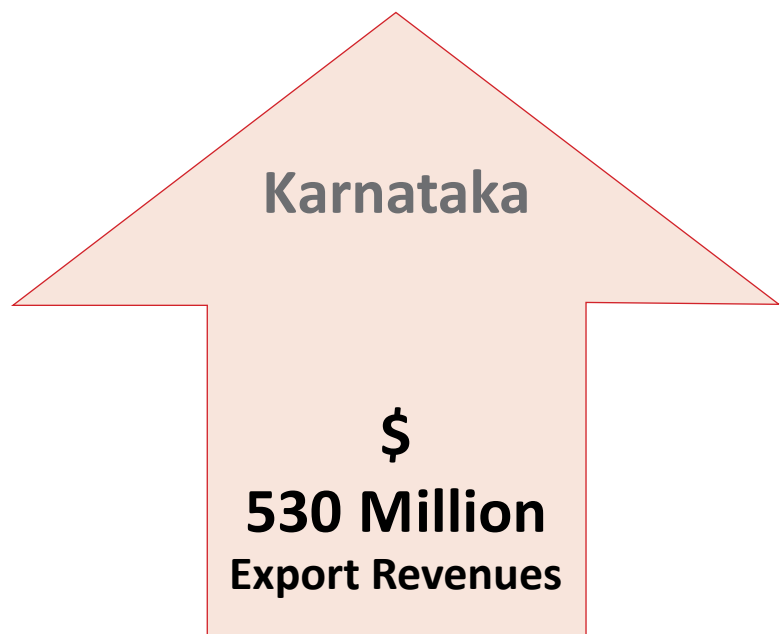
Karnataka's Contribution

Karnataka contributes 26 percent of India's biotech revenues. This is likely to rise going forward



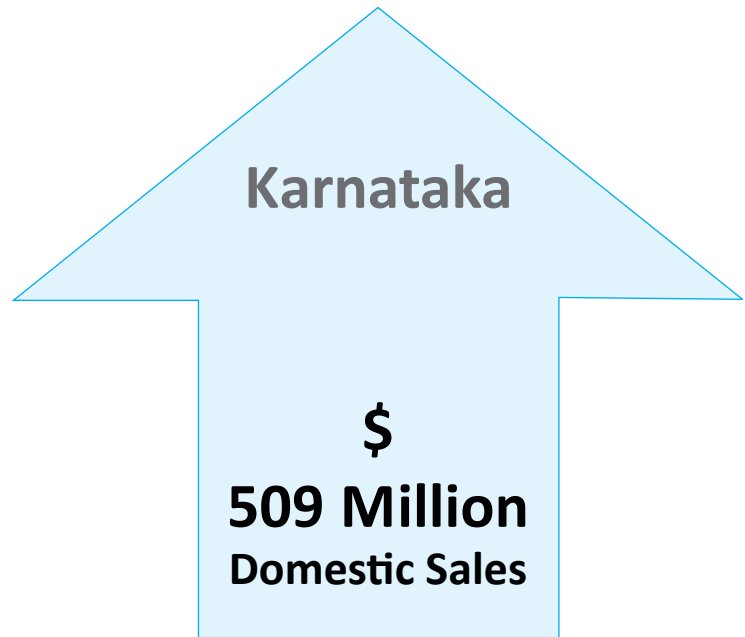
Biotech Export Revenues

The biotech export revenues contribution of Karnataka is \$530 million.



Biotech Domestic Sales

The domestic sales revenues of Karnataka is currently \$509 million

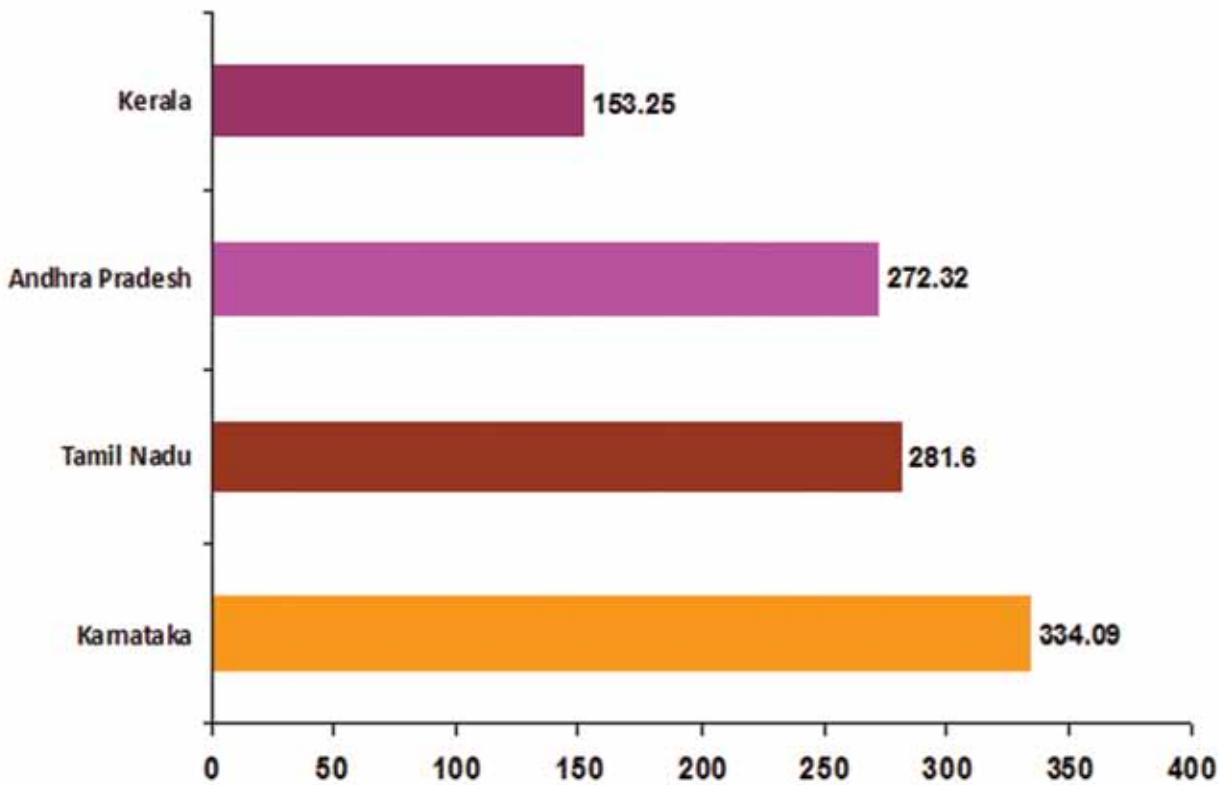


Investment

Biotechnology enterprises in Karnataka contribute 50 percent of India's revenues in biotechnology.

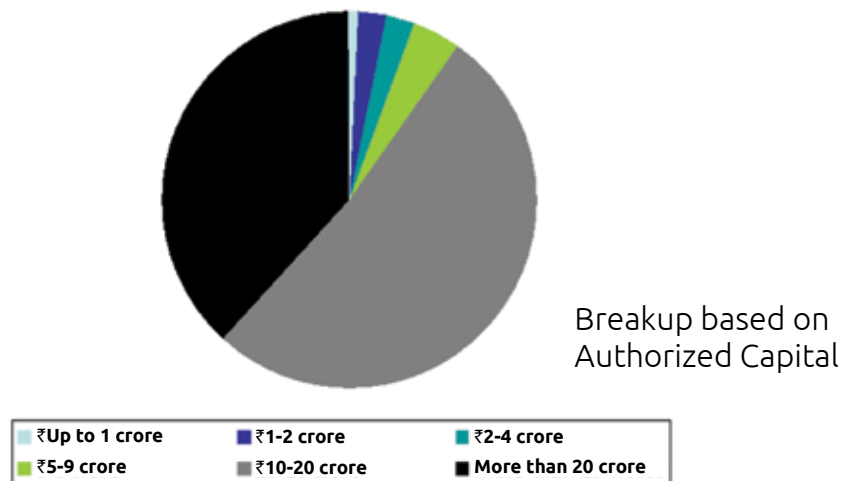
From just 131 companies in 2005-06, Karnataka has been steadily attracting investments and is now home to more than 60 percent of India's biotechnology companies.

Karnataka- Highest in R&D expenditure in South India



Source: Expenditure On R&D By State Governments, DST 2012

Industry Snapshot





Karnataka in Patents

Indian Patent Applications

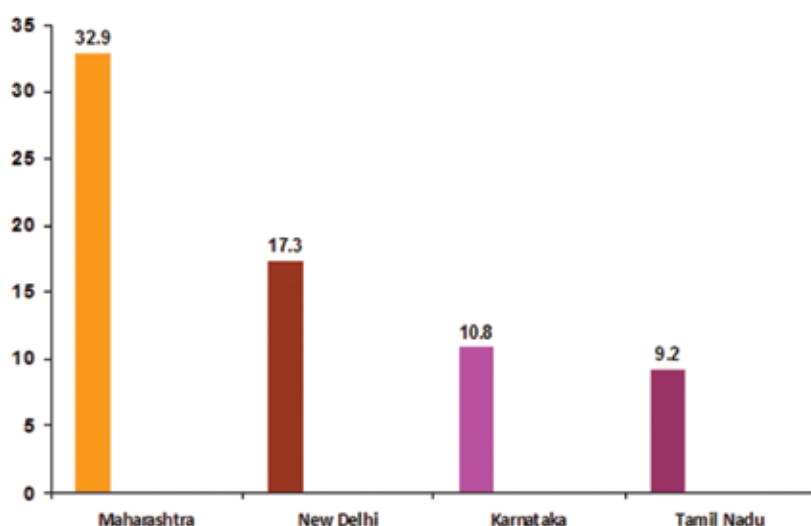
South Indian States	1990–94	1995–99	2000–04	2005–10
Karnataka	294 (4.7)	457 (5.0)	679 (5.2)	3704 (10.8)
Andhra Pradesh	112 (1.8)	436 (4.7)	744 (5.7)	2483 (7.3)
Tamil Nadu	536 (8.6)	755 (8.2)	1169 (9.0)	3141 (9.2)

Between 1991-94 and 2005-10, Karnataka succeeded in more than doubling its share in domestic patent applications

The Geography of Patenting In India: Patterns and Determinants by Jaya Prakash Pradhan
Centre for Studies in Economics and Planning, Central University of Gujarat
https://mpr.ub.uni-muenchen.de/50818/1/MPRA_paper_50818.pdf

Indian Patents: Karnataka leapfrogs to 3rd place

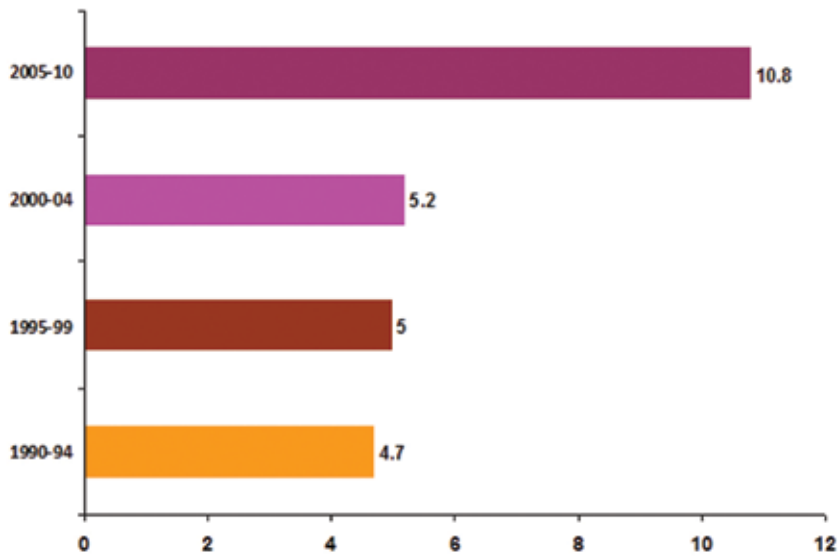
These are the top four patent filing regions in India. Delhi and Maharashtra had the highest R&D concentrations, while Karnataka leapfrogged to 3rd position



The percentages are based on patent filings between 2005-10

The Geography of Patenting In India: Patterns and Determinants by Jaya Prakash Pradhan
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Karnataka's Rise in Patents

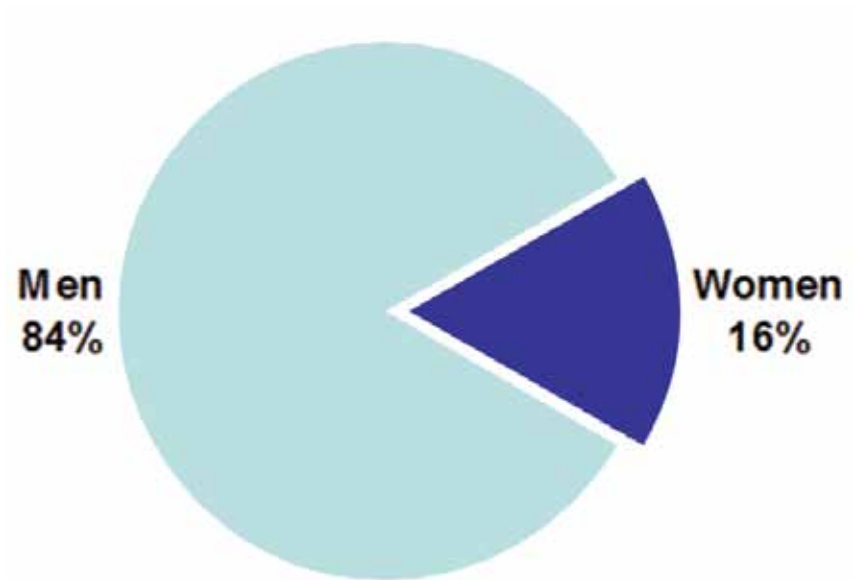


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Human Resources Landscape

Human Resources



As per CMR estimates, the biotech industry in Karnataka, including MNCs and start-ups, employs approximately 19,000 scientists in the biotechnology sector

As home for the largest number of biotech companies, Karnataka also is the largest employer of biotech scientists

Scientific Workforce:
By Gender

Human Resources Landscape

The human resources landscape in life sciences sector in Karnataka is currently seeing the following job profiles.

- ➔ Basic science
- ➔ Preclinical or development
- ➔ Engineering
- ➔ Product development
- ➔ Epidemiologist
- ➔ Regulatory affairs
- ➔ Clinical research
- ➔ Clinical data analysis
- ➔ Drug safety
- ➔ Medical affairs
- ➔ Biostatistician
- ➔ Bioinformatics



Categories of Employees

Scientific

- ➔ Basic science
- ➔ Preclinical or development
- ➔ Engineering
- ➔ Product development
- ➔ Epidemiologist
- ➔ Regulatory affairs
- ➔ Clinical research
- ➔ Clinical data analysis
- ➔ Drug safety
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- ➔ Bioinformatics

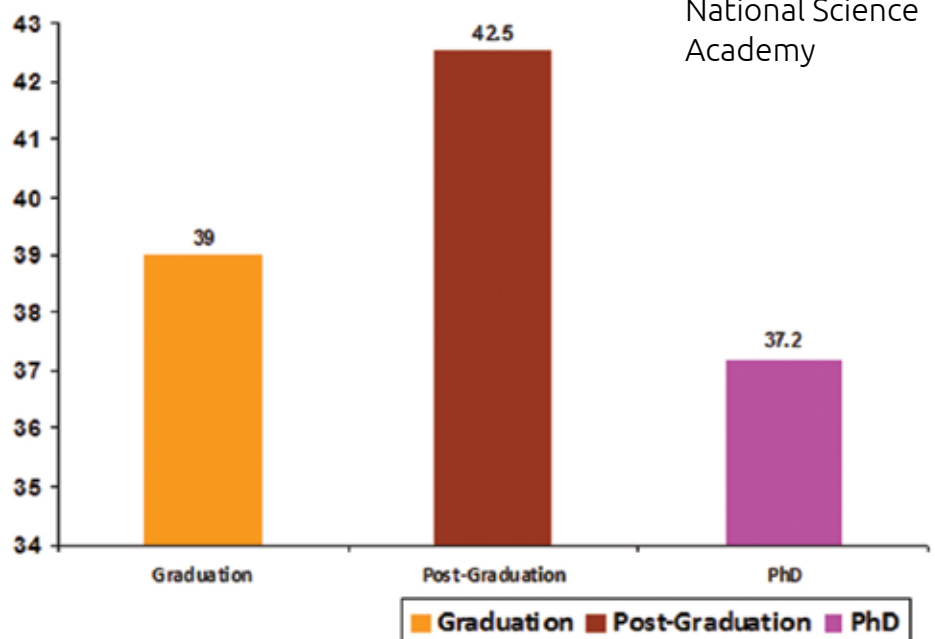
Commercial

- ➔ Marketing
- ➔ Product management
- ➔ Project management
- ➔ Market research
- ➔ Sales
- ➔ Business development
- ➔ Market access
- ➔ Pharmacoeconomics
- ➔ Medical writing

Women Scientists

In India, women constitute only 15.6 percent of the total manpower employed in R&D establishments and 12.7 percent of the total personnel in corporate R&D.

In Karnataka, the demographic segmentation remains in line with above. However, women scientists are fairly successful. For instance, between 2004-2008, 69 percent of the women scientists were able to secure new research projects for funding (INSA)

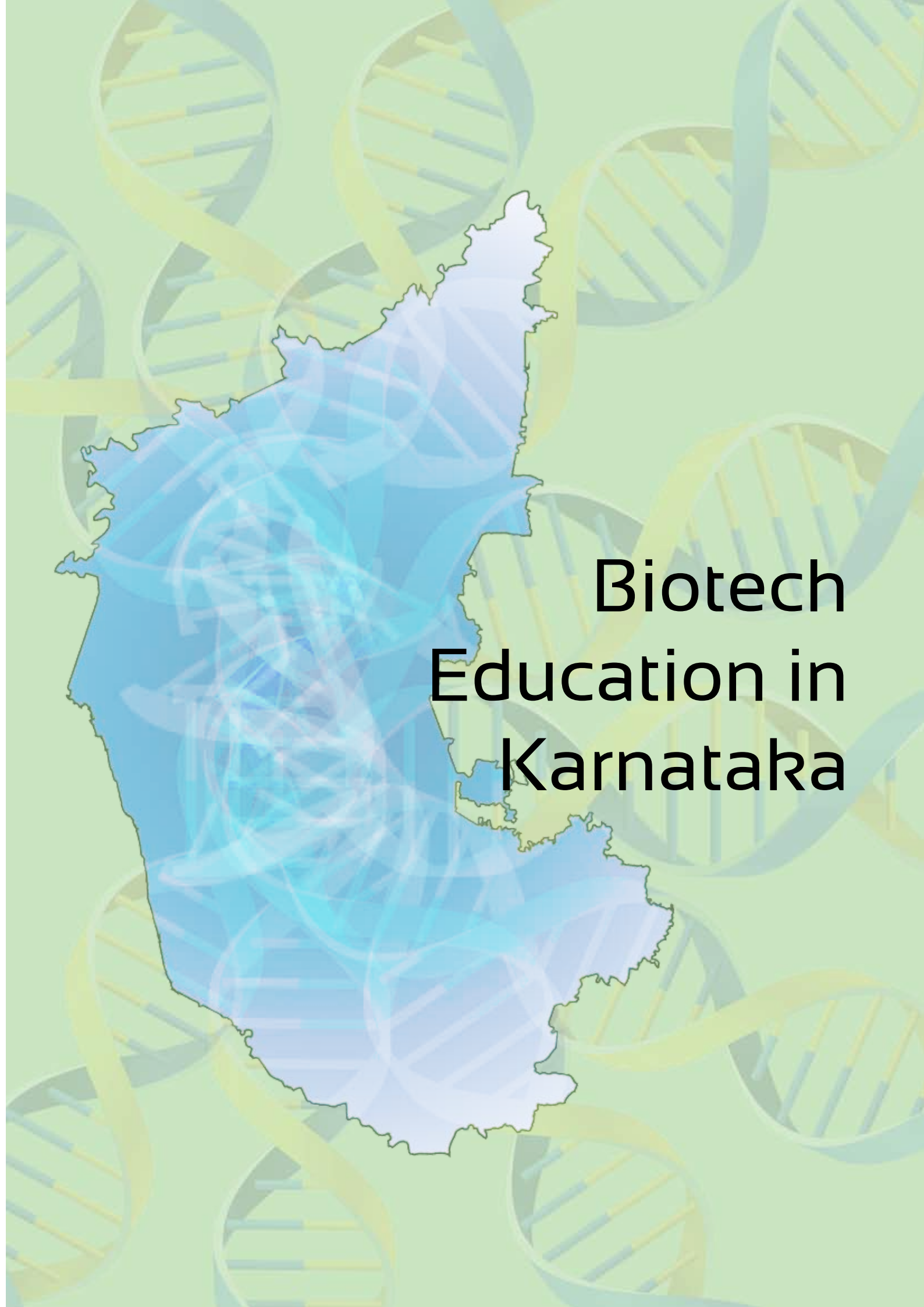


Source: Indian National Science Academy

Production and Manufacturing Units

Karnataka ranks 10th in the number of pharma manufacturing units in India

Karnataka is home to 221 formulation units and 74 bulk drug units, contributing three percent to the total manufacturing units in the country



Biotech Education in Karnataka

Biotech Education

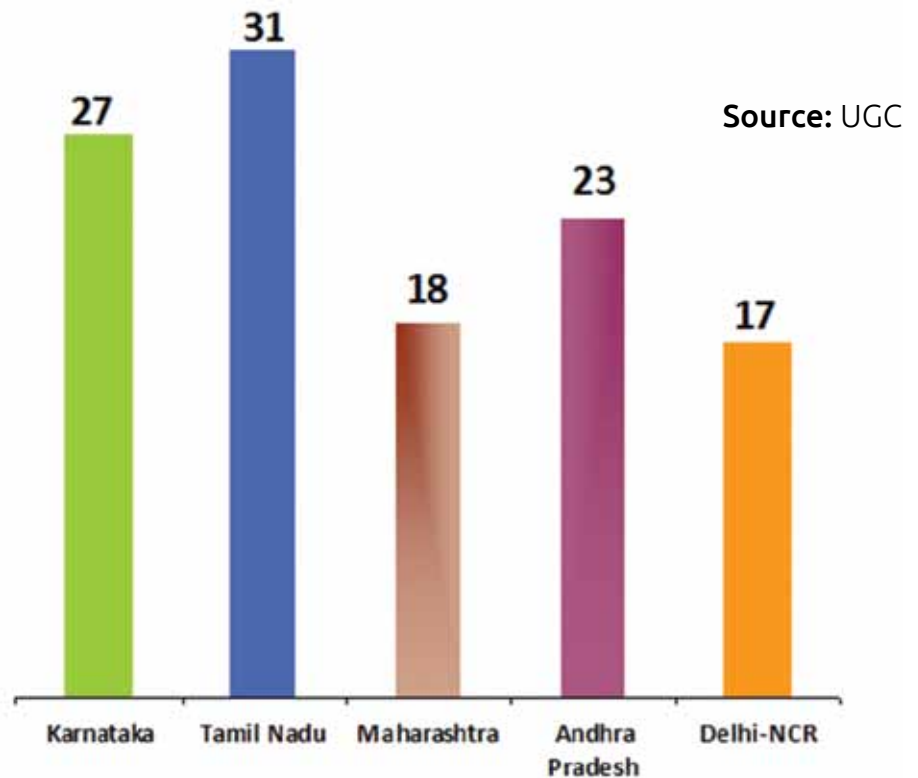
Karnataka Vs Other States

Karnataka is placed second in terms of number of universities offering biotech courses at the UG and PG level, including engineering courses

Karnataka stands out for:

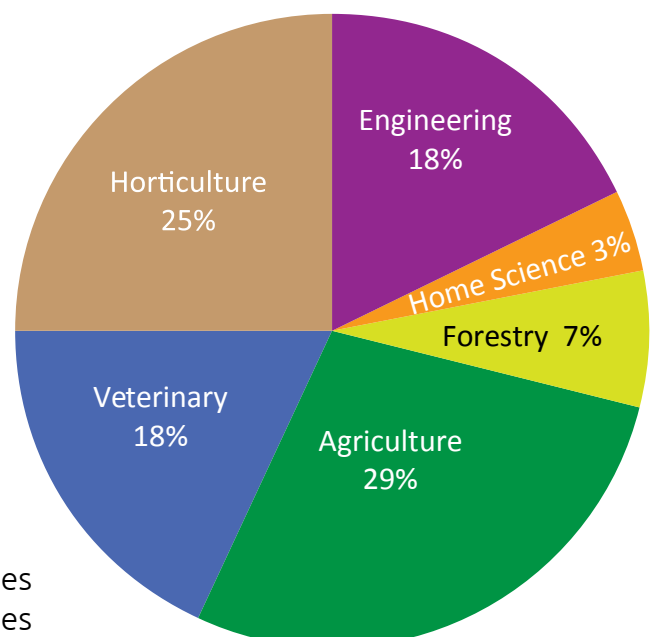
Diverse range of specialized universities with a single domain focus, ranging from agri-biotechnology to biotech engineering

Karnataka's Biotech Finishing Schools was launched by Government of Karnataka, in association with the Government of India. These program offers different specialisations leading to skill generation, and rapid employment of graduates.



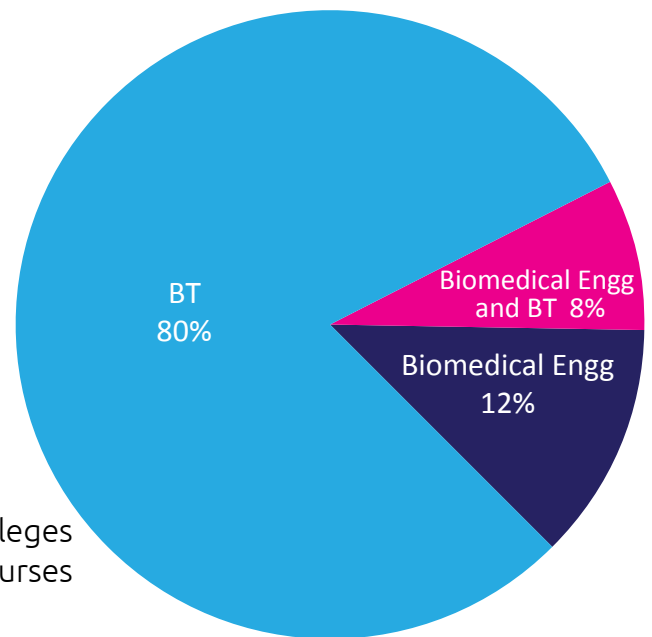
Karnataka

At the UG Level



Breakup of Colleges offering UG courses

Karnataka At the PG Level



Breakup of colleges offering PG Courses

BT Finishing Schools

The Karnataka government launched 12 biotechnology finishing schools in eight districts of Karnataka, chosen on the basis of available infrastructure and faculty and collaborations with industry

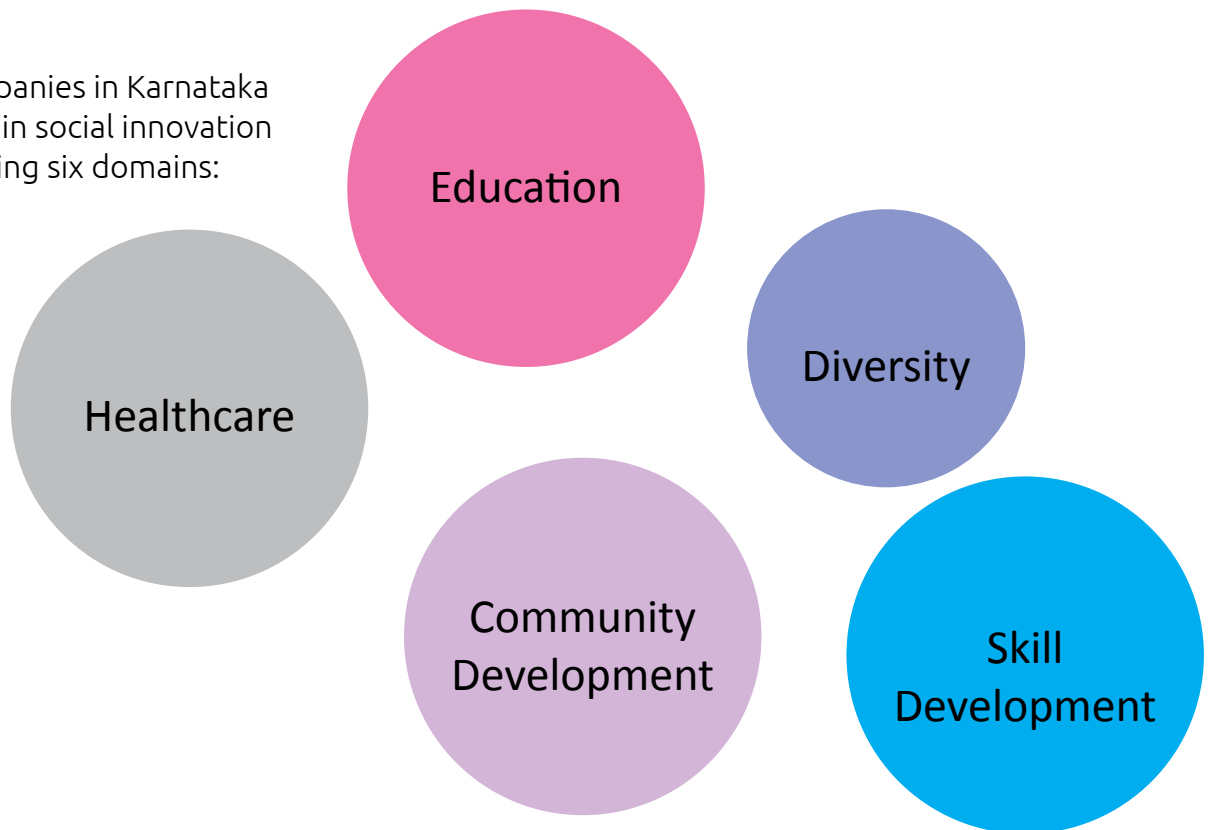
- ➔ Maharani Lakshmi Ammani College for Women, Bengaluru
- ➔ Daynand Sagar Institution, Bengaluru
- ➔ Oxford College of Science, Bengaluru
- ➔ Padmashree Institute of Management, Bengaluru
- ➔ Probiosis, Bengaluru
- ➔ PES Institute of Technology, Bengaluru
- ➔ Siddaganga Institute of Technology, Tumkur
- ➔ JSS University, Mysore
- ➔ St Aloysius College, Mangalore
- ➔ Manipal University, Manipal
- ➔ MM Arts & Science College, Sirsi
- ➔ Visvesvaraya College of Applied Sciences, Gulbarga



Social Innovation in Karnataka

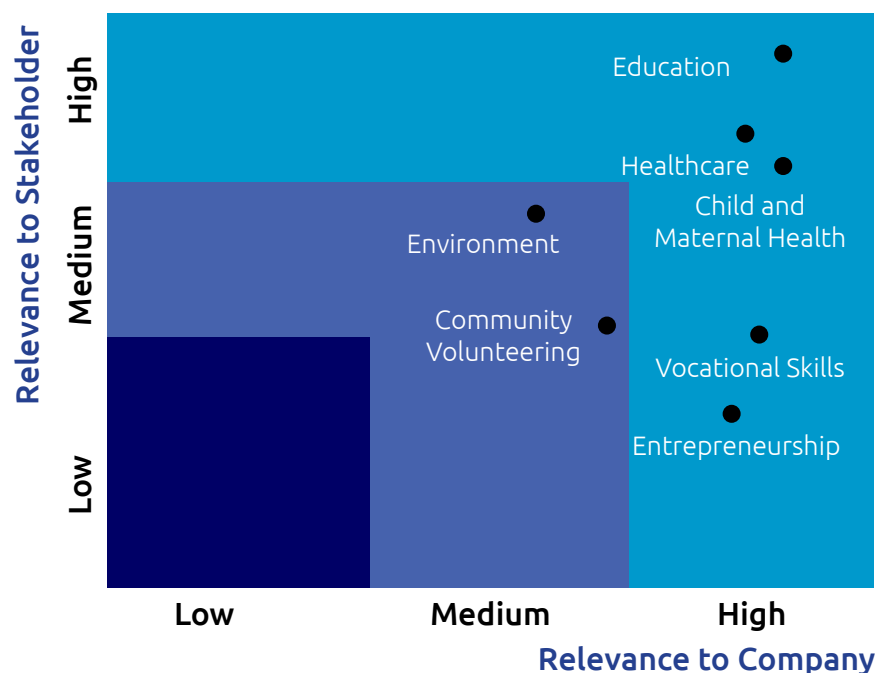
Social Innovation in Karnataka

Biotech companies in Karnataka are engaged in social innovation in the following six domains:



Social Innovation Profile

The social responsibility charter of biotech companies in Karnataka includes initiatives in the domains mapped in the matrix





The Research Methodology

Our Approach

Initial Screening Phase

- ➔ Secondary Research through
 - CMR – BioSpectrum KnowledgeBase
 - Registration of Companies Database
- ➔ Initial screening of companies

Final Phase

- ➔ Primary research and preparation of final report

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Department of Information Technology (IT),
Biotechnology (BT), and
Science and Technology (S&T)
Government of Karnataka.

The report was prepared by CMR and *BioSpectrum*
and authored by Mr Prabhu Ram, general manager
lifesciences and innovation advisory, CMR.