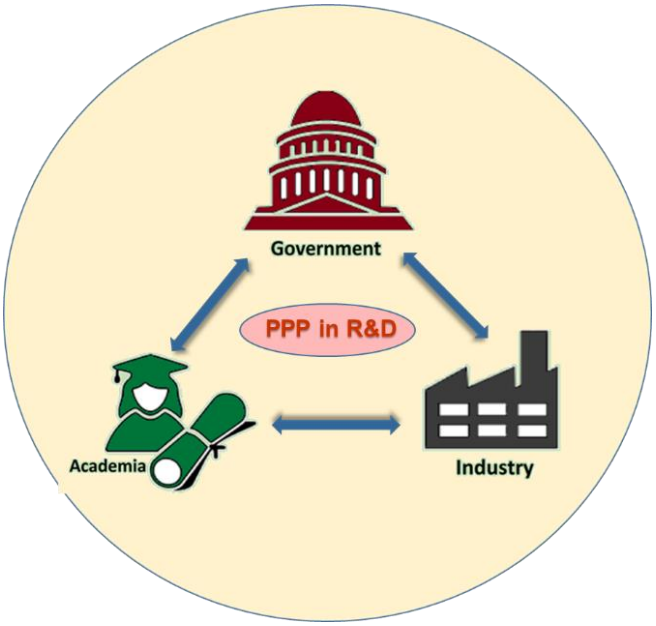
DST- Centre for Policy Research, Panjab University, Chandigarh

(DST/PRC/CPR-03/2013, Estd. in Jan. 2014)



Activity Booklet

(2014-2019)

https://cpr.puchd.ac.in/

Index

Vision of the Centre

To Strengthen Technology-led Innovation Ecosystem in India

Objectives

A. *Promoting Public Private Partnerships (PPP) for R&D*

B. *Enhancing Private Sector's Investment in R&D*

C. *Promoting Culture of Patenting in the Academic Sector*

The Centre has carried out evidence based studies in the above mentioned objectives and published in the form of Books, Reports and Research Papers. More than 20 conferences/workshops/seminars/symposiums have been organized in which officials/scientists of NITI Aayog, Funding Agencies, O/PSA, UGC, AICTE, Universities, National Res. Labs and representatives from Industries (small, medium and large scale) and Industry Associations shared their experiences.

In addition, the Centre has created an a) Industry-Academia web portal of Chandigarh region, b) Medical Device Innovation Cluster, c) Contributed significantly in drafting 'University Industry Linkage Programme' for UGC and organized hands-on-training in the fields of 'Patent Search and Filing'. A few of the recommendations have been carried forward at the national level.

This booklet provides a glimpse of the activities carried out by the Centre. Detailed information can be accessed from the Centre's website (https://cpr.puchd.ac.in/).

A) Promoting Public Private Partnerships for R&D in India

Activity 1: Prevalent Models of PPP for R&D in India

- *Bi-partite Model*
  - *a) Academia-Industry*
  - *b) Government-Industry*
- *Tri-Partite Model (Triple Helix Model)*
  - *a) Government-Academia-Industry*

Examples of PPP for R&D in India

Government-Industry Model (GIM)

a) **Global Innovation and Technological Alliance (GITA), New Delhi**

b) **Autonomous Institutes *(ARAI, Pune)***

c) **Centres of Excellence *(CoEIoT, New Delhi)***

d) **Technology Business Incubators *(LSI, IKP, Hyderabad; TBI at SRI, Delhi; Venture Centre, Pune)***

e) **Textile Research Associations *(SITRA, Coimbatore)***

Government-Academia-Industry Model (GAIM)

a) **Autonomous Academic Institutes *(ICT-Mumbai; BCP Mumbai)***

b) **Centres of Excellence *(NCFlexE, IIT- Kanpur; TCOEs at IITs)***

c) **D. Technology Business Incubators *(BITS, Pilani; MUTBI, Manipal)***

d) **Science Parks *(IITM Res. Park, IIT-Madras; STEP, IIT-Kharagpur)***

Academia-Industry Model (AIM)

a) **Industrial Set-ups in Academic Sector *(Industrial Chairs & Industrial Laboratories in IITs)***

b) **Centres of Excellence *(IBM Software CoEs)***

c) **Industry Supported I- A Cells *(Pfizer-FITT, IIT-Delhi)***

Promising Examples of PPP in R&D

- **Institute of Chemical Technology (ICT), Mumbai** is a perfect example of industry-academia collaboration. More than 90% of the faculty members have industry-academia research projects. Industry has set up teaching/research labs, offers scholarships and fellowships to students/researcher; lectures by industry experts and industrial interactions by way of special lectures and collaborative symposia/conferences is a common feature. Alumni connect helps ICT in connecting with the private sector and catalyze employment for the students.

- **Biotechnology Industrial Research Assistance Council (BIRAC)**, is a Section 8 Biotech Company, floated by Department of Biotechnology, GoI, for the promotion of PPP in R&D. It has dedicated funding schemes ranging from ideation, early stage development, late stage development and commercialization. These schemes cater to academia, industry and budding entrepreneurs. Both public and private sectors have equal financial contributions in the BIRAC Projects.

- **Venture Centre, Pune**, is a self-sustaining Technology Business Incubator for promoting entrepreneurship. It has generated many successful start-ups.

- **IIT-M Research Park,** Chennai, India's first university based research park that has attained global recognition in the domains of entrepreneurship, spin-offs and I-A R&D. It houses numerous enterprises (small and big) which carry out R&D, scale up and commercialization of products.

- **Pfizer-FITT, IIT-Delhi,** a unique partnership model in which Pfizer provides funding, resources, expertise and infrastructure to propel India's healthcare innovations.

- **NCFlexE at IIT-Kanpur**, MeitY supported Centre of Excellence to address industry aligned research in field of flexible electronics. Nearly 19 Industries are member of the Centre. Many innovative technologies have been developed via I-A collaborations.

Activity 2: Collation of I-A R&D Funding Schemes of Public and Private Sectors

The I-A schemes of various government funding agencies, industrial associations and financial institutions have been studied briefly.

- *Public Sector:*
  a) Funding Agencies-DST, TDB, TIFAC, GITA, NSTEDB, DBT, BIRAC, CSIR, DSIR, NRDC, MeitY, DRDO, MHRD, ICAR and ICMR.
  b) Financial Institutions-SIDBI, NABARD, SBI and PNB
- *Private Sector:*
  a) Industrial Associations-FICCI, CII, ASSOCHAM and NASSCOM
  b) Financial Institutions-ICICI and IDBI

Stand-out Industry-Academia R&D Schemes in India

DST	BIRAC	DSIR
➢ Prime Minister's Fellowship Scheme for Doctoral Research ➢ Technology Development Programmes ➢ National Initiative for Developing and Harnessing Innovations (NIDHI)	➢ Small Business Innovation Research Initiative (SBIRI) ➢ Biotechnology Industry Partnership Programme (BIPP) ➢ Promoting Academic Research Conversion to Enterprise (PACE) ➢ Biotechnology Incubation Grant (BIG)	➢ Patent Acquisition and Collaborative Research and Technology Development (PACE) ➢ Promoting Innovations in Individuals, Start-ups and MSMEs (PRISM)
MHRD	**DRDO**	**CSIR**
➢ Impacting Research Innovation and Technology (IMPRINT) India	➢ The DRDO-FICCI Accelerated Technology Assessment and Commercialization (ATAC) Programme	➢ New Millennium Indian Technology Leadership Initiative (NMITLI)
MeitY	**NITI Aayog**	**O/PSA**
➢ Multiplier Grant Scheme (MGS)	➢ Atal Innovation Mission (AIM)	➢ Accelerating Growth of New India's Innovations (AGNIi) ➢ City Clusters

Activity 3: Mapping of R&D attributes of IITs (Questionnaire based study)

R&D Attributes of First Generation IITs (2010-15)

IP Attributes	IIT Kharagpur	IIT Bombay	IIT Madras	IIT Kanpur	IIT Delhi
Patents: ➢ Filed ➢ Granted	231 13	569 >61	239 25	204 9	146 25
Technology Available	214	409	358	6	50
Technologies Licensed	24	>140	60	60	15
Revenue generated from tech. transfers (Mn USD)	26.42	29.56	65.22	33.67	19.21
Start-ups	104	>26	89	26	16
Industrial Collaborations (MoUs)	72	225	~176	124	8
Revenue generated Consultancies (Mn USD)	9.86 (2011-16)	20.29	35.52	7.39	19.52 (2010-14)

Translational Research Ecosystem of IITs can act as a template for other universities showing a potential for innovation to catapult their innovation efforts.

Activity 4: Case Studies on Successful I-A R&D Collaborated Research

Feedback from scientists, belonging to public and private sectors, was sought to identify and enumerate hindrances/roadblocks experienced while undertaking I-A collaborative research, along with potential alternatives for improving the I-A R&D collaborations.

S. No.	Academia	Industry
1	Prof. Shantanu Roy, IIT-Delhi	Thermax Pvt. Ltd., , Pune
2	Dr. Sunil Jha, IIT-Delhi	BSES Yamuna Power Ltd., New Delhi
3	Prof. R.K. Saxena, University of Delhi	Tata Chemical Ltd. Pune, Maharashtra
4	Prof. K. Sankaran, Anna University, Chennai	TMI Systems, Bangalore
5	Prof. Dinesh Goyal, Thapar University, Patiala	Goetze India Pvt. Ltd., Patiala
6	Prof. V.B. Patravale, ICT-Mumbai	DKS Medical Technologies Pvt. Ltd., Surat
7	Prof. O.P. Katare, PU, Chd.	IPCA Labs Pvt. Ltd., Mumbai

8	**Prof. Neelima Kshirsagar** **Seth GS Medical College and KEM Hospital, Mumbai**	**Lifecare Innovations Pvt. Ltd., Gurgaon**

This study brought out the bottlenecks encountered by scientists while undertaking collaborative research, along with propositions for strengthening I-A res. collaborations.

Hindrances: *Limited research infrastructural set up; Lack of industry funding; Lack of skilled manpower; Lack of 'complete set-up' for taking laboratory research to commercialization stage; and Government policies and Bureaucratic hiccups.*

Suggested reforms for stimulating I-A R&D partnerships*: Creation of a dedicated I-A cell in university; Provision of Instrument Maintenance Grant; Creation of I-A website; Implementation of minimum purchase scheme from Start-up companies; and Accessibility to risk sharing grant.*

Activity 5: PPP for R&D Models…A Global Perspective

Subsequent to reviewing and analyzing the PPP models of R&D in India, research on PPPs as an effective tool for generation of novel innovations in foreign nations was initiated.

Stand-out Schemes/Programmes Related to PPP for R&D of Select Countries

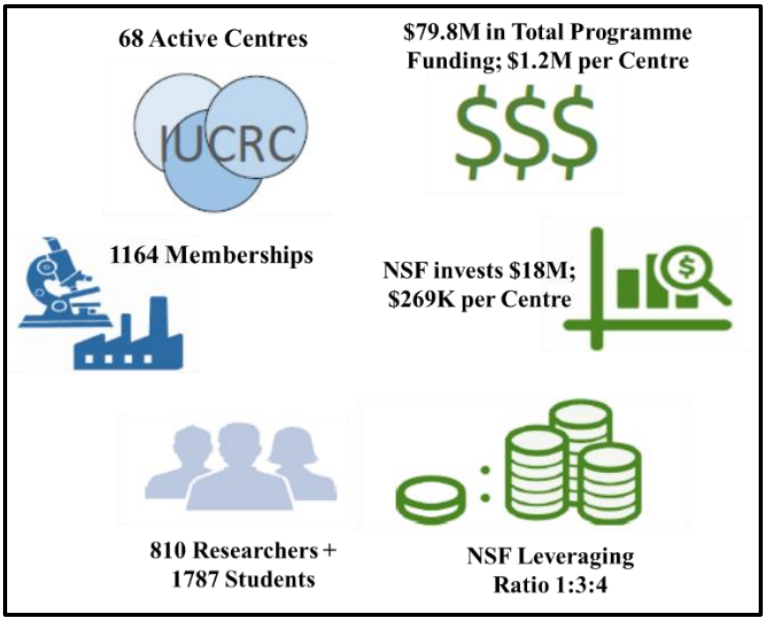
UNITED STATES OF AMERICA ➢ Industry/University Cooperative Research Centres (I/UCRC) Programme ➢ Grant Opportunities for Academic Liaison with Industry (GOALI) ➢ Small Business Innovation Research (SBIR) ➢ Small Business Technology Transfer (STTR)	**CANADA** ➢ Industrial Research Assistance Programme (IRAP) ➢ Mitacs ➢ Idea to Innovation Grants (I2I) ➢ Networks of Centres of Excellence
FRANCE ➢ Joint Laboratories between Public Research Organizations and SMEs or Intermediate-Sized Enterprises (LabCom) ➢ Carnot Initiative ➢ Technology Transfer Acceleration Company - SATT ➢ Industrial Training Convention by Research	**GERMANY** ➢ Fraunhofer Society ➢ Research Campus ➢ Validation of the Technological and Social Innovative Potential of Scientific Research - VIP+ ➢ Industrial Collective Research for SMEs
UNITED KINGDOM ➢ Catapult Programme ➢ Knowledge Transfer Partnerships (KTP) ➢ Higher Education Innovation Fund (HEIF) ➢ N8-Industry Innovation Forum	**IRELAND** ➢ Knowledge Transfer Ireland ➢ Innovation Partnership Programme ➢ Industry R&D Group (IRDG) ➢ Innovation Vouchers

ISRAEL ➢ MAGNET ➢ Israel Tech Transfer Organization (ITTN)	**FINLAND** ➢ Business Finland ➢ VIGO Accelerator Programme
NETHERLANDS ➢ Technological Top Institutes (TTIs) ➢ Top Consortia for Knowledge and Innovation (TKI) ➢ TechnoPartner Programme ➢ Innovation-Oriented Research Programme (IOP)	**SWITZERLAND** ➢ BRIDGE Programme ➢ Advisory Services-Innovation Mentors (IMs) ➢ Innovation Cheques ➢ EUREKA Initiatives ➢ Joint Technology Initiatives
SOUTH KOREA ➢ Korea Small Business Innovation Research (KOSBIR) Programme ➢ Industrial Complex Cluster Programme (ICCP)	**SWEDEN** ➢ The Knowledge Triangle ➢ Industrial Research Institutes ➢ Coaching Programme for SMEs
JAPAN ➢ Adaptable & Seamless Tech. Transfer Programme through Target-Driven R&D (A-STEP) ➢ Collaborative Research Based on Industrial Demand ➢ Strategic Promotion of Innovative R&D ➢ Super Cluster Programme	**AUSTRALIA** ➢ Cooperative Research Centres ➢ ARC Linkage Project ➢ ARC Centres of Excellence ➢ Rural Research Development Corporations
CHINA ➢ Torch Programme ➢ Blue Flame Programme ➢ Spark Programme ➢ Science and Technology for Wellbeing Programme	**SINGAPORE** ➢ Corporate Laboratory@University ➢ Technology Consortia ➢ Gap funding for co-development
TAIWAN ➢ Germination Programme ➢ PIONEER Grants for Technology Development by Academia-Industry Cooperation ➢ Global Research & Industry Alliance (GLORIA) Programme	

Examples of Outstanding Global Models of PPP

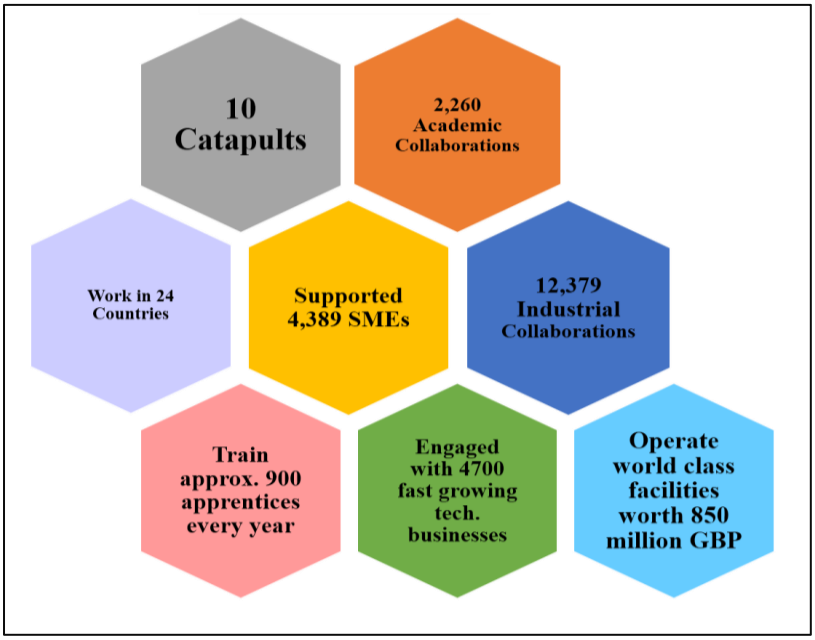
Industry University Cooperative Research Centre (I/UCRC) of USA

(PPP Model for I-A Collaboration)



Catapult Centres of UK CATAPULT

(PPP Model for Promotion of Mission Oriented R&D)



Support offered by the A-STEP programme of Japan

	Stage I		*Stage II*	*Stage III*	
Support Type	**Industrial needs response type**	**Strategic theme-focused type**	**Seeds development type**	**NexTEP-B type**	**NexTEP-A type**
Objectives	Bolster Japanese industrial competitiveness by contributing to the solution of technical issues common in industry	Return outstanding achievements of JST's basic research programmes to society and create the foundations of new industries	Lower the technical risks of research outcomes of academia and establish core competency of private companies by utilizing academia's technology seeds	Support private companies who carry out high-risk development which uses research achievements of academia. (NexTEP-B is available only for small and medium-sized enterprises whose capital is 1 billion YEN[#] or less.)	
R&D Fields	Specific R&D themes		Broad area		
Applicants' Affiliation	Academia	Academia and Industry	Academia and Industry	Industry	
IP	Not required		Required		
R&D Expenses (supplied by JST)	up to 25 million YEN per year	up to 50 million YEN per year	20 million ~500 million YEN per R&D period	Up to 300 million YEN per R&D period	Up to 1.5 billion YEN per R&D period
	Grant		Matching funds	Matching funds plus payment of royalties	Quasi-loan plus payment of royalties
R&D Period	2～5 years	Up to 6 years	2～6 years	up to 5 years	Up to 10 years

Source: https://www.jst.go.jp/tt/EN/univ-ip/a-step.html#supportContent

[#](1 YEN = 0.0090 USD)

Fraunhofer Institutes (72) in Germany: PPP Model for Contract Research

Economic Impact	Scientific Impact
➢ **Annual business volume - 2551 million EUR** ➢ **Project revenue by Contract Research - 1486 million EUR** ➢ **Licensing fee revenue - 109 million EUR** ➢ **International revenue - 293 million EUR (2018)** ➢ **Fraunhofer holds shares and equity investments in 90 companies across a wide variety of sectors**	➢ **Patents granted - 3272 (till 2018)** ➢ **Active licensing contracts - 2515 (till 2018)** ➢ **Supported 39 new spin-off projects in 2018** ➢ **Invention disclosures in 2018 - 712** ➢ **Licensing agreements signed in 2018 - 384**

The **Carnot Initiative** of France confers the 'Carnot Label' to PRIs with proven, high level research and innovation capabilities dedicated to fostering innovation with industrial partners. The network of 38 Carnot Institutes in the year 2018 has led to the generation of approx. 26400 peer-reviewed articles, filed 1120 patents and spun-off 80 companies.

Under the initiative of **Knowledge Transfer Partnerships** (KTP) of UK, an associate (graduate) is positioned in the business to mediate between the companies and academic experts for continued transfer of knowledge and resolution of real-world problems. At present 825 Industry-Academia partnerships, involving 100 Universities and 850 Associates, are active, which have been mediated by 35 Knowledge Transfer Advisers

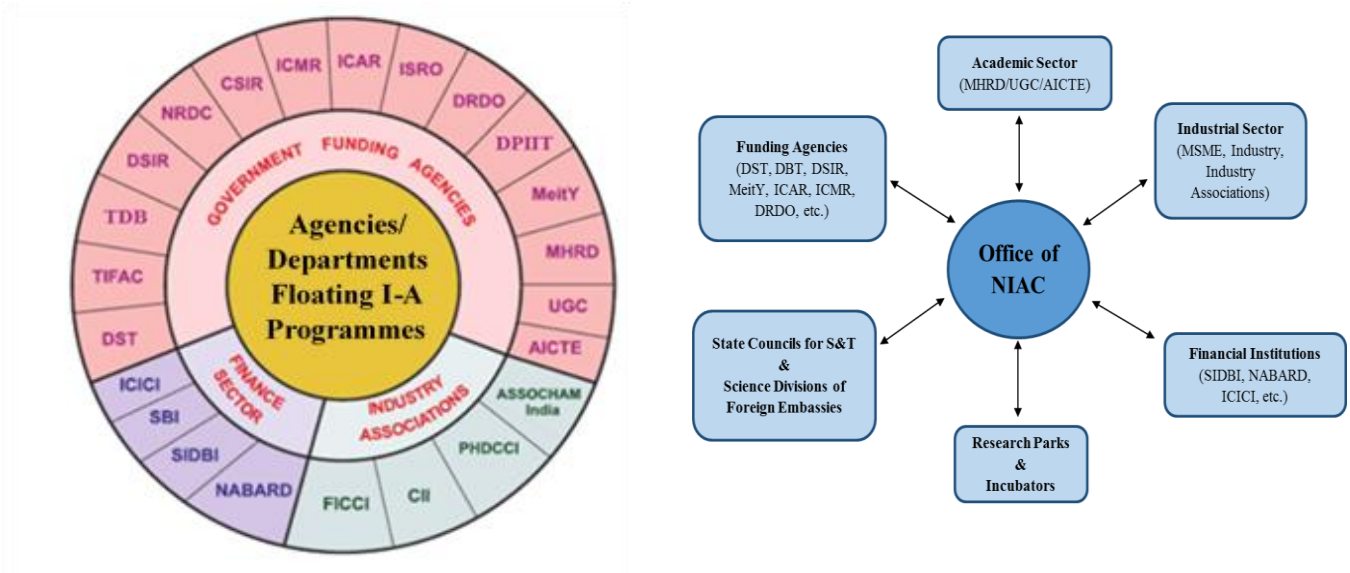
In Singapore, the National Research Foundation initiated a scheme for establishing **Corporate Laboratory@University.** It caters to setting up laboratories of industries in autonomous universities for performing industry-driven and relevant research activities. 14 Corporate Laboratories have been established which work in different domains.

In many countries including, Ireland, **Innovation Vouchers** scheme allows SMEs to apply for a voucher of certain amount for availing academic & intellectual support from any of the registered knowledge providers. Over a period of 10 years, 4500 Irish Innovation Vouchers have been redeemed, worth approx. EUR 22 million.

Recommendations

1. **Laying down Legislative Framework for I-A Collaborations**
   The I-A alliances in developed countries like USA, Japan, UK, S. Korea, etc. are governed by a definite Policy Framework / Acts / Laws. A legal framework acts as a testimony to the commitment of the nation for stimulating PPP in domains of R&D. Similar legal framework may be introduced by the GoI.

2. **Setting up 'National Industry-Academia Centre' (NIAC)**
   India has myriad I-A programmes/schemes/activities administered by the government funding agencies, industries/industry associations and the finance sector. However, a common platform that comprehensively seats all this information is yet to be put in place. Therefore, a centralized body designated as 'National Industry-Academia Centre' (NIAC) may be instituted wherein, all the information pertaining to I-A ecosystem is available and accessible to one and all. Such an overarching body may act as an umbilical/apex centre, orchestrating the opportunities and obstacles of the I-A roadmap. The office of NIAC should network with various entities as mentioned below.

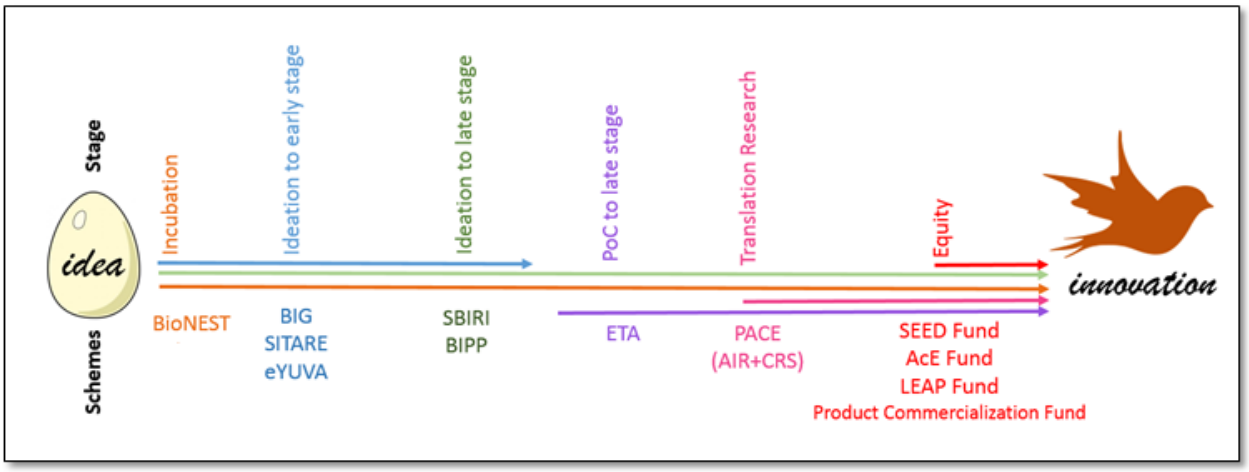


3.

4. **Establishing 'Innovation Cells' in Various Ministries of GoI**
   India has over 50 Central Ministries. However, only a few of them have active engagements in R&D activities. As innovation is the mantra of economic progress/stability in the current era, it is suggested that all ministries at the Central level may set up dedicated 'Innovation Cell'. These Cells should have dedicated 'R&D funds' for promoting domain specific innovation activities. I-A R&D collaborations should form a significant part of these 'Innovation Cells'. It is also suggested that each State may set aside dedicated 'R&D funds' for innovation activities.

5. **Introduction of Funding Schemes Dedicated to Each Stage of Innovation**

One of the reasons of great successes of BIRAC for promoting R&D innovations is attributed to the design of funding schemes. This agency has floated schemes covering all stages of innovation, i.e. Ideation, Proof-of-Concept, Prototype Development and Gap Funding schemes. In addition, these schemes cater to public as well as private sectors.



Majority of funding agencies either do not cater to all stages of innovation or their schemes are not formulated in a concrete manner. It is suggested that funding agencies may remodel their funding programs (related to translational research) on the lines of BIRAC.

6. **Positioning 'Moderators' between Industry and Academia**

It has been globally accepted that a scientists do not have the capability to identify/engage with industry for assisting him/her in her translational pursuits. Similarly, industry finds it hard to identify suitable university/scientist to solve its R&D problems. To provide better synergism between industry and academia, countries like UK & Canada have placed 'Moderators' in the academic institutes engaged in research and innovation. Such Moderators, called as Innovation Advisors/Industrial Technology Advisors, enable conversion of public sector research into commercial entities and bring industrial problems to the academic sector. These 'Moderators' usually have expertise in the fields of entrepreneurship, business management and translational research. It is suggested that funding agencies like DST, DBT, Meity etc. may create dedicated funds for positioning such Moderators in universities promoting innovations.

7. **Setting up State University R&D Support Fund**

A study conducted by our Centre has demonstrated that many State universities, despite financial constraints, are generating more patents than the Central Universities. patents.

Patent (granted) Profile of Top 100 NIRF Universities (2010-17)

Universities (number)	Patents Granted (%)
State Universities (44)	66 (48.17%)
Private Universities (24)	20 (14.59%)
Central Universities (32)	51 (37.22%)
Total Universities (100)	Total Patents Granted - 137

Unfortunately, scientists from State Universities are not able to compete for R&D funds offered by Funding agencies. In order to boost innovations in the State Universities, it is suggested that a dedicated 'State University R&D Fund' may be introduced by the Funding agencies. This initiative will certainly boost the innovation ecosystem of the State universities.

8. **Establishing 'Centres for Evaluation of TRLs'**

The process of innovation graduates through various phases, right from ideation to product/technology commercialization. Each stage requires a different kind of intervention and monitoring. Understanding the vitality of this concept, BIRAC, GoI has developed theme-specific 9 level TRL model of its own. These models assist BIRAC in assessing the funding schemes that an innovation is eligible to, based on the maturity of the technology.

As majority of the scientists are not TRL savvy, they show case their innovative technologies to industry, which are not at the stage (i.e. advanced TRL) for industry-adoption, and thus rejected by the industry. To fill this void it is suggested that Funding agencies may a) set up a 'TRL Assessment Cell' for assessing TRL of newly developed technologies, and b) mention TRLs for each scheme floated by it.

9. **Linking Academic Institutes with Multitude of Stakeholders** – For developing technology-led innovations, an institute may not have all the wherewithal e.g. academic competence, infrastructure, industry connect, requisite finances and so on. Therefore, it is advocated that each academic institute

should forge a strong net-working/linking with requisite partners, as mentioned below.

Linking Academia with Multitude of Stakeholders

MHRD may create an **'Innovation Incentivization Fund'** for HEIs entering into meaningful partnerships with entities, that strengthen its Innovation capability.

10. A holistic *Industry-Academia Ecosystem* of institutes (IITs, IISc-Bangalore, ICT-Mumbai) excelling in generation of patents, products and technologies, reveals some additional features (mentioned below) which need to be looked into as well.

i. Setting up of '**I-A Chairs**', '**I-A Post-Doctoral Fellows**', '**I-A Doctoral Research**' and '**Student Fellowships**'. Industries may be encouraged to set up these chairs and fellowships via CSR funds.
ii. Mobility of Scientists/Researchers/Students from Universities to Industries and vice versa.
iii. **Incentivizing institutes and industries** actively engaged in I-A R&D activities.
iv. Creation of regional '**Academia/Knowledge Clusters'** as a single widow for industries.
v. Establishment of '**Institute Business Cells**' in HEIs for networking with industries and financial institutions (banks, VCs and Angel investors etc.).

11. Creation of Industry Specific Academia Web-Portal

Industry-Academia Web-Portals are one of the effective means of bridging the disconnect. Industry is oblivious of the existence of professional talent, infrastructure and innovative products/technologies in the Universities, Colleges and Research Institutes. Similarly, academia is

Not only ignorant about the type and number of industries existing in India, but also how and whom to approach for addressing the needs of the academic sector. Developed countries have dedicated I-A related web portals. It is recommended that academia-specific and industry-specific web portals be created at the State and National levels.

12. Linking Universities with IITs and IIMs

Newly created IITs are being mentored by old IITs. On similar lines it is suggested that research oriented universities may be mentored by IITs/IIMs for a period of at least five years, so as to expose these universities to the tricks and trades of Translational Research.

13. Linking Industries with Academia

MSMEs are the backbone of the industrial sector of any country. Also, many of the MSMEs are financially starved and find it hard to address their R&D problems. On the other hand, academic institutes are abundant in intelligentsia, but do not have genuine real-time R&D problems to work on. To address both these issues, it is suggested that Research-oriented universities may be mandated to tie up with at least 5 industries, preferably MSMEs, for pursuing innovative research. The funds for the initial period of collaborative research may come from the Funding agencies, in terms of grants/loans/equities. Once the project has reached the stage of Proof-of-Concept, then Industry should finance the project. OR

Funding agencies may think of setting up **Domain Specific Centres of Excellence** in the Universities. For an initial period of five years or so, the funds for the establishment and running of the Centre may be provided by the Funding agencies. Later on, such Centres should become self-reliant and only a *core grant* be sanctioned by the Funding agency.

B) Enhancing Private Sector Investment in R&D

Activity 1: Global Analysis of Pvt. Sector R&D Incentivization - Lessons for India

Nations excelling in innovations provide a pool of incentives to the private sector, especially MSMEs, for enhancing their R&D activities. A comparative study was carried out to understand various incentives (tax incentives & financial support) prevalent in select countries excelling in innovation index.

R&D Incentivization followed by Select Innovation Based Countries

S. No.	Country	Funding Support	R&D Tax Credit	R&D Tax Deduction	Vol. based	Increm-ental based	Refun-dable	Carry Forwa-rded	Preferential Tax Incentives		Patent Box
									SMEs	Collab. Res.	
1.	Australia	√	√	n.s.	√	×	√ (SMEs)	√	√	×	×
2.	Canada	√	√	n.s.	√	×	√ (SMEs)	√	√	×	×
3.	China	√	n.s.	√	×	×	×	×	×	×	√
4.	Finland	n.s.	×	×	×	×	×	×	×	×	×
5.	France	√	√	n.s.	√	×	√	√	√	√	√
6.	Germany	√	×	×	×	×	×	×	×	×	×
7.	India	× (limited)	n.s.	√	√	×	×	√ (loss)	×	×	√
8.	Ireland	√	√	n.s.	√	×	√	√	×	×	√
9.	Israel	√	n.s.	√	×	×	×	×	×	×	×
10.	Japan	√	n.s.	n.s.	√	√ (R&D intensity)	×	×	√	√	×
11.	Netherlands	√	n.s.	n.s.	×	×	×	×	×	×	√
12.	S. Korea	√	√	n.s.	×	√	×	√	√	×	√
13.	Singapore	√	n.s.	√	×	×	×	×	×	×	×
14.	Sweden	×	×	×	√	×	√	×	×	×	×
15.	Switzerland	√	×	×	×	×	×	×	×	×	×
16.	Taiwan	√	√	√	√	×	n.s.	n.s.	√	n.s.	√
17.	UK	√	√	√	√	×	√ (SMEs)	√	×	×	√
18.	USA	√	√	n.s.	×	√	√ (start-ups)	√	√	×	√

Source: OECD Compendium of R&D Incentives (2016, 2017); PWC (2017), Deloitte Touche Tohmatsu Limited (2017, 2018); n.s: not specified; SMEs: Small and Medium Enterprises

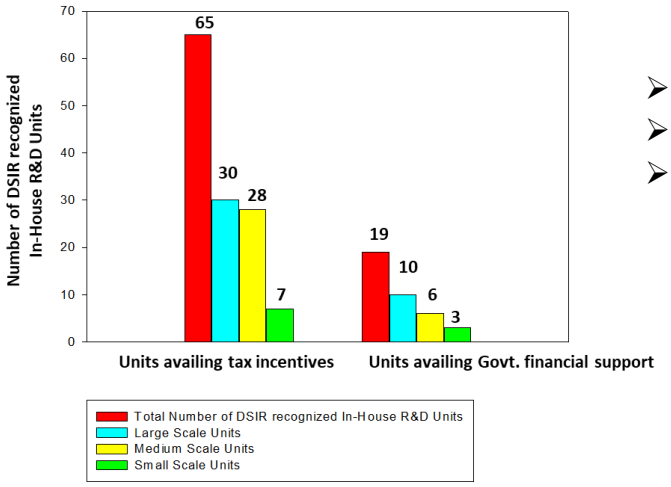
To stimulate private sector's R&D investment in India, specific financial R&D support schemes may be introduced by Central Government as well as State Governments. Additionally, provision of enhanced tax incentives on incremental R&D, I-A collaborative research and R&D carried out by SMEs may be adopted.

Activity 2: Impact of Government Incentivization on R&D Output of DSIR Recognized In-House R&D Units in Pharma Sector

Department of Scientific and Industrial Research (DSIR), established by Ministry of Science and Technology, GoI, 'recognizes and accredits the private sector's in-house research units for availing government mediated R&D tax incentives. Non-accredited research units of the private sector cannot avail such incentives.

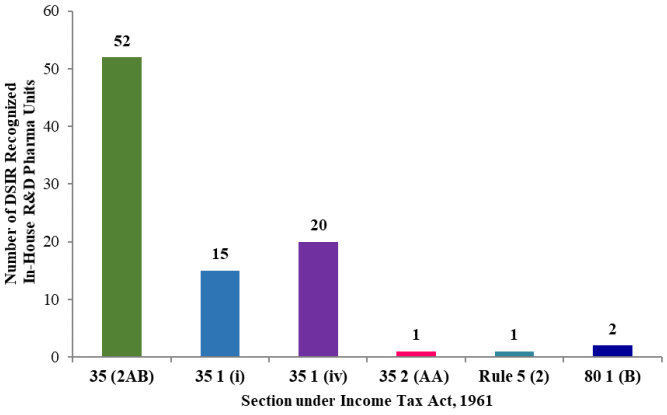
Many pharma industries avail R&D benefits provided by GoI. In a joint study, carried out in an association with DSIR, GoI, 87 DSIR recognized in-house pharma R&D units, were examined for the type of government mediated incentives availed by them and their impact on innovations.

R&D Incentives Availed by DSIR Recognized In-House R&D Units (Pharma)



- *74% of the units availed R&D tax incentives*
- *21% units availed financial support for R&D.*
- *These incentives had positive impact on the generation of innovations by the private sector.*

Types of R&D Tax Super-Deduction Availed by DSIR Recognized In-House R&D Units (Pharma)



- *59% of the units avail R&D tax super deduction under Section 35 (2AB)*
- *23% &18 % of units avail tax-incentives under Section 35-1 (iv) & 35-1 (i), respectively*
- *Only 1 unit availed tax incentive for sponsored/collaborative research with academia*

Section of Income Tax Act 1961	R&D Incentivization
35 (2AB)	Tax deduction (150%) on expenditure of an industry on performing In-House R&D
35 1 (i)	Tax deduction (150%) on sum paid as a salary component for research work
35 1 (iv)	Tax deduction (150%) on capital expenditure incurred (e.g. pilot plant, biosafety facilities etc.)
35 2 (AA)	Tax deduction (125%) on amount paid to national res. lab./university/institute for carrying out research work
Rule 5 (2)	Tax deduction (150%) for amount used in developing plant and machinery to be used for scientific research
80 1 (B)	Tax deduction on profits and gains from industrial research

Recommendations

1. **Introducing Tax Reforms**
   Enhancement of private sector 'R&D Tax Incentives' on the following lines – a) Graded Tax incentives as per scale of the industry, as is being practised by S. Korea, US, UK and Japan; b) Special Tax Incentives for I-A Collaborative Research (Japan and Singapore); c) Target Based Tax Incentives (US and China); d) Tax Incentives for Venture Capitalists (China); e) Tax Incentives on Incremental R&D (US and Japan); f) Development and Expansion Incentives (Singapore); g) Commercialization Incentives (Singapore)

2. **Introduce 'Innovation Vouchers/Cheques'**.
   On the lines of **'Innovation Voucher'** schemes of countries like Ireland, Finland and UK, scheme of Innovation Vouchers may be introduced in India. Such Vouchers are availed by the private sector, especially SMEs, to engage with public research institutes for initiating research collaborations.

3. **Creation of Innovation/Technology Hubs for SMEs**
   In order to boost the innovation ecosystem of financially starved industries, funding agencies, in association with M/oMSME, may set up sector agnostic 'Innovation/Technology Hubs for SMEs' at select PRIs, preferably in close proximity to the MSME clusters, under PPP mode.

4. **Institution of a 'Fast Track R&D Fund'**
   Many R&D problems of micro and small industries can be solved by incurring relatively small amount of money i.e. less than one or two lakhs of rupees. However, starvation of finances as well as reluctance of applying for government funds (lengthy paper work and too much time taken for disbursement of funds) preclude the industries for seeking such funds. To overcome this predicament, it is proposed that funding agencies like DST may institute 'Fast Track R&D Fund' for addressing industrial R&D issues requiring small amount of funds. These funds could be transferred to the industries (or partnering university) within a month's time after the receipt of research proposal.

5. **Incentivizing Schemes for Industries**
   Government may introduce incentivization schemes (cash or kind) encouraging industries to set up research laboratories/R&D skill Centres in PRIs. The extent of incentivization may vary depending on the financial commitment of the industries for establishing Industrial Labs@PRIs.

6. **Creation of Industry Research and Development Group (IRDG)**
   Ireland has IRDG comprising of industries engaged in R&D. Such a group advises the government on the needs and reforms needed to promote innovation in Ireland industries. Such domain specific groups may be created in India.

C) Promoting Culture of Patenting in the Academic Sector

Activity 1: Patent Filing Profile (2018-19) of Asian Countries

Indicator	Number of Patent Applications				
	Singapore	Japan	S. Korea	China	India
Global Ranking	17	3	4	1	7
Total no. of Patent Applications	10,930	3,18,479	2,04,775	13,81,594	46,582
No. of Patents Applications by Residents (%age)	1,606 (14.69)	2,60,198 (81.70)	1,59,110 (77.70)	12,46,197 (90.20)	14,953 (32.10)
No. of Patents Applications by Non-residents (%age)	9,324 (85.31)	58,281 (18.30)	45,665 (22.30)	1,35,397 (9.80)	31,629 (67.90)

Source – *World Intellectual Property Indicators* (https://www.wipo.int/publications/en/details.jsp?id=4464)

India not only lags behind other Asian countries in the number of patent applications filed, but also two third of patents filed are by non-residents.

Activity 2: Understanding Patent Ecosystem in India (2017-18)

Top 10 Indian Applicants for Patents from R&D Organizations

S. No.	R&D Organizations	Applications Filed
1.	CSIR, New Delhi	230
2.	DRDO, New Delhi	58
3.	G.H.R Labs and Research Centre, Nagpur	50
4.	ICAR, New Delhi	41
5.	Hetero Research Foundation, Hyderabad	23
6.	Allinov Research & Development Pvt. Ltd., Krishnagiri	20
7.	MSN Research & Development Centre, Hyderabad	19
8.	L&T Technology Services Ltd., Vadodra	18

Top 10 Indian Applicants for Patents from Higher Education Institutes

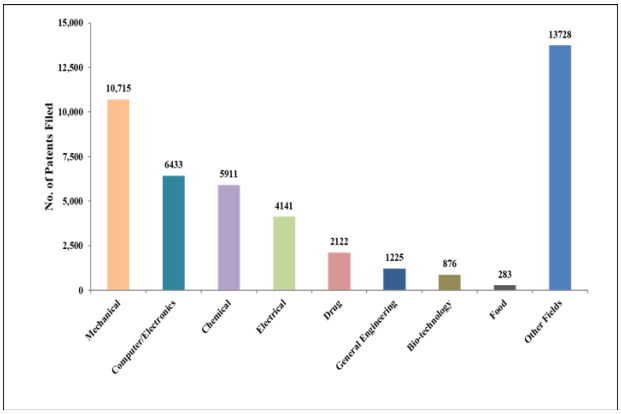
S. No.	Higher Education Institutes	Applications Filed
1.	IITs (Collective)	400
2.	Amity University, Noida	106
3.	Indian Institute of Science, Bangalore	54
4.	Vel Tech Dr. RR & Dr. SR Technical University, Chennai	50
5.	G.H. Raisoni College of Engineering, Nagpur	49
6.	Bharath University, Chennai	45
7.	Chandigarh Group of Colleges, Chandigarh	30
8.	Chitkara University, Rajpura	29

9.	Sun Pharma Advanced Research Company Limited, Mumbai	14	9.	Hindustan Institute of Technology & Science, Chennai	28
10.	ISRO, Bengaluru & GSP Crop Science Pvt. Ltd., Ahmedabad	13	10.	National Institutes of Technology (Collective)	26

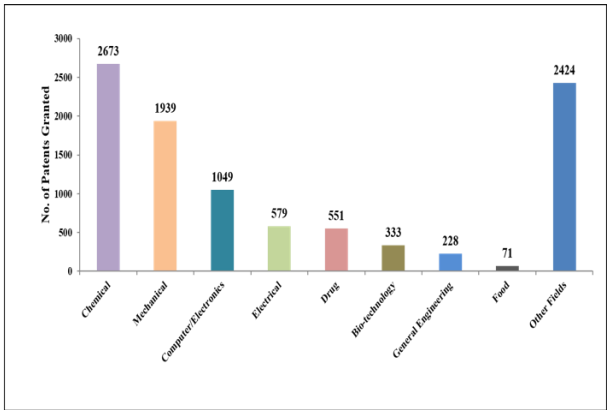
Source – *Annual Report, Indian Patent Office (2017-18) Blue: Public sector org. / Red: Private sector org.*

Activity 3: Fields Wise Categorization of Patents (2017-18)

Patent Applications Filed in under Major Fields of Inventions



Patents Granted under Major Fields of Inventions

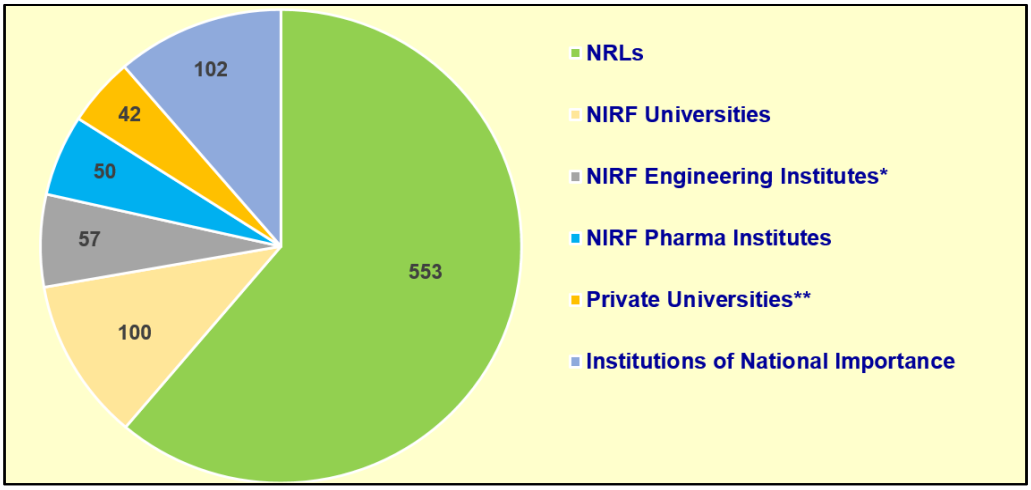


Source – *Annual Report, Indian Patent Office (2017-18)*

Activity 4: Mapping Patents and Research Publications of Higher Education Institutes and National R&D Laboratories of India (2010-16)

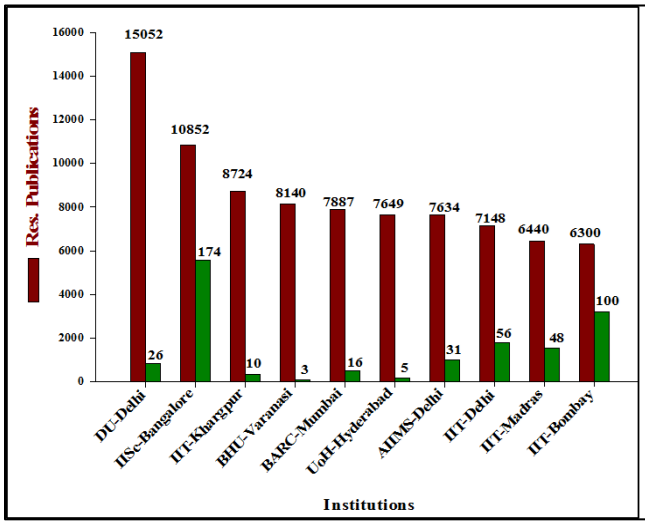
A study was conducted on 904 institutions comprising of HEIs (351) and national R&D labs (553) for the period of 2010-16.

Breakup of Institutions Considered for the Study

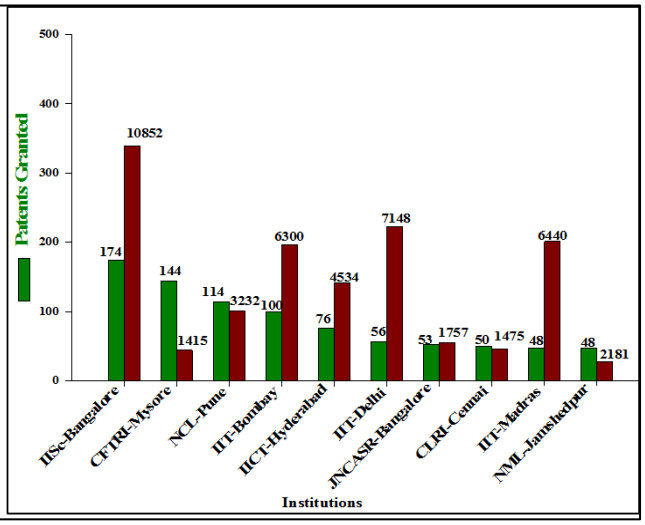


** 43 institutes are included in INIs*
*** 8 universities are included in the list of top 100 NIRF universities*

Top 10 Ranked Institutions Based on Number of Res. Publications (2010-16)



Top Ranked 10 Institutions Based on Number of Patents (Granted) (2010-16)

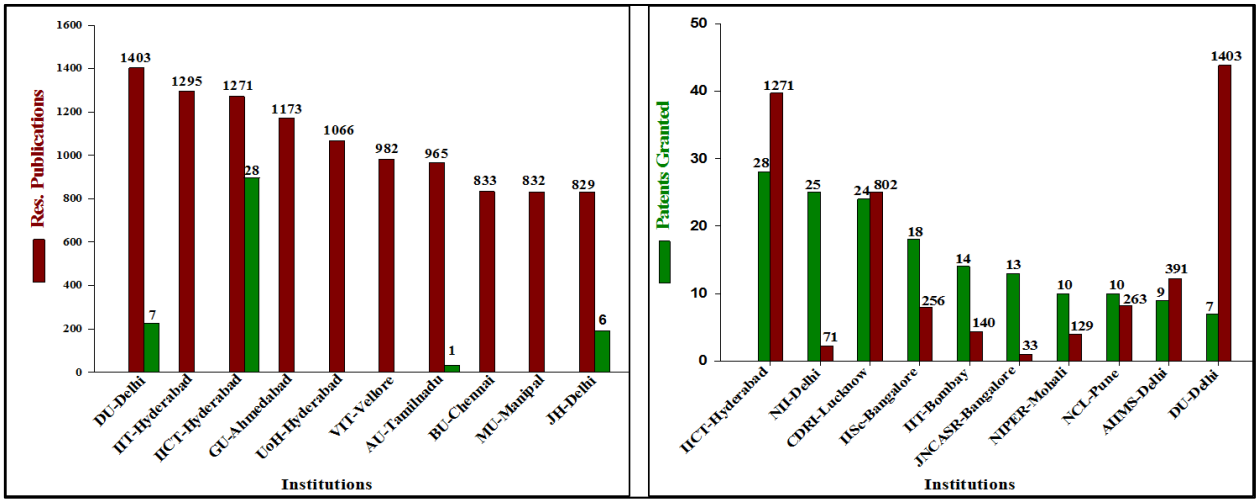


Only 4 institutes have good number of Research Publications as well number of Granted Patents i.e. IISc, Bangalore; IIT, Bombay; IIT, Madras and IIT, Delhi.

Field Wise Analysis: *The data (Res. Publications & Patents) was further analyzed on the basis of various fields such as Chemical Sciences, Pharma/Drugs, Engineering, Biotech/Food/Agriculture, Food/Agriculture and Medical Sciences.*

Top 10 Ranked Institutions Based on Number of Res. Publications in the Field of Pharma/Drugs (2010-16)

Top 10 Ranked Institutions Based on Number of Patents (Granted) in the Field of Pharma/Drugs (2010-16)



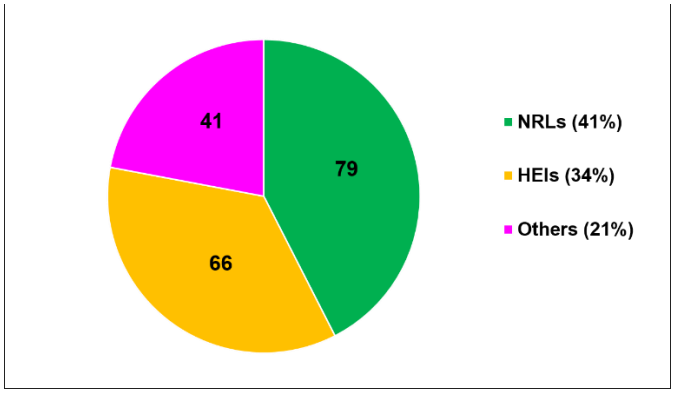
Domain Specific Leading Institutes in terms of Number of Research Publications and Patents (granted)

Research Publications (Number)	Patents Granted (Number)	Research Publications (Number)	Patents Granted (Number)
1. Physics		**2. Engineering**	
BARC, Mumbai (3583)	IISc., Bangalore (26)	IIT, Kharagpur (4211)	IISc., Bangalore (97)
IISc., Bangalore (3527)	JNCASR, Bangalore (15)	IISc., Bangalore (3442)	IIT, Bombay (46)
DU, New Delhi (2850)	IIT, Madras (9)	IIT, New Delhi (3143)	CIMFR, Dhanbad (30)
3. Pharma/ Drug		**4. Chemical Sciences**	
DU, New Delhi (1403)	IICT, Hyderabad (28)	IISc., Bangalore (6974)	NCL, Pune (97)
IIT, Hyderabad (1295)	NII, New Delhi (25)	BARC, Mumbai (5987)	IICT, Hyderabad (44)
IICT, Hyderabad (1271)	CDRI, Lucknow (24)	IIT, Kharagpur (5890)	NML, Jamshedpur (43)
5. Medical Science		**6. Biotech/Food/Agriculture**	
AIIMS, New Delhi (6521)	JNCASR, Bangalore (8)	DU, New Delhi (6225)	CFTRI, Mysore (121)
PGIMER, Chandigarh (5046)	IIT, Bombay (3)	IARI, New Delhi (4536)	NIIH, Mumbai (41)
DU, New Delhi (3715)	NII, New Delhi (3)	BHU, Varanasi (3920)	IISc., Bangalore (25)

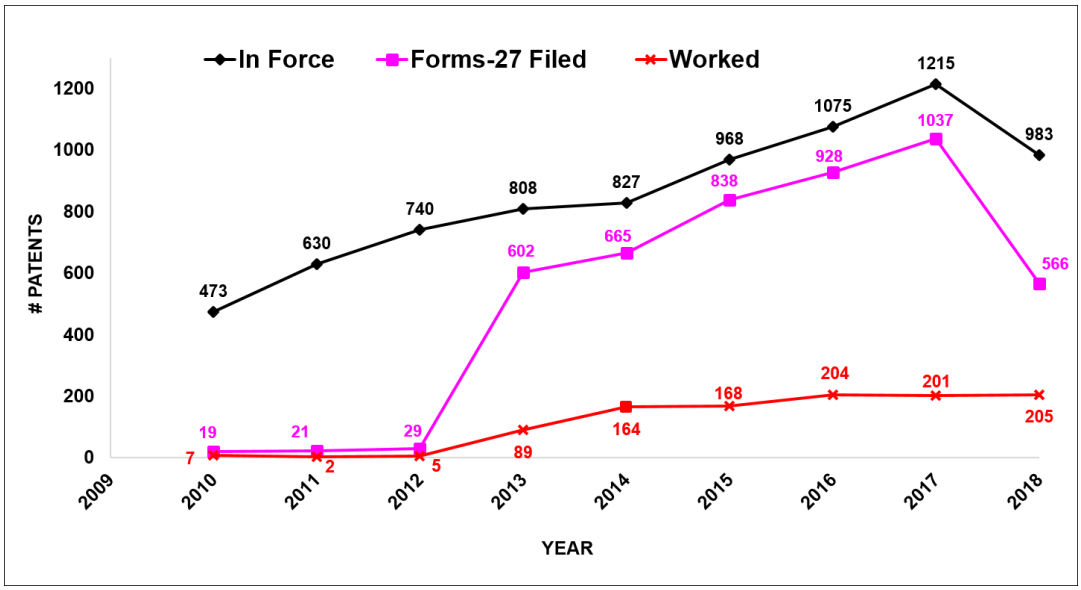
Activity 5: Working Status of Patents Granted to HEIs and NRLs of India

In extension to the work 'Patents & Publications of 904 institutions', the commercialization status of patents granted (Jan 2010-Dec 2017) was analyzed.

Breakup of Total # Patents Granted (1961) in India (Jan. 2010-Dec. 2017)

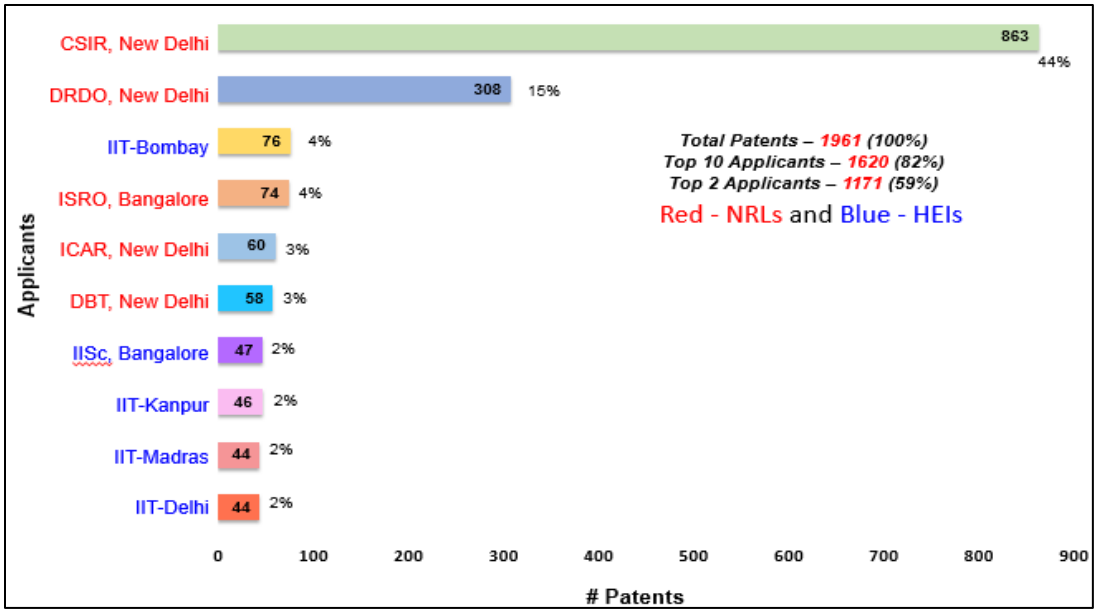


Year Wise Trend of #Patents In-force, Form-27 Filed and Working Patents

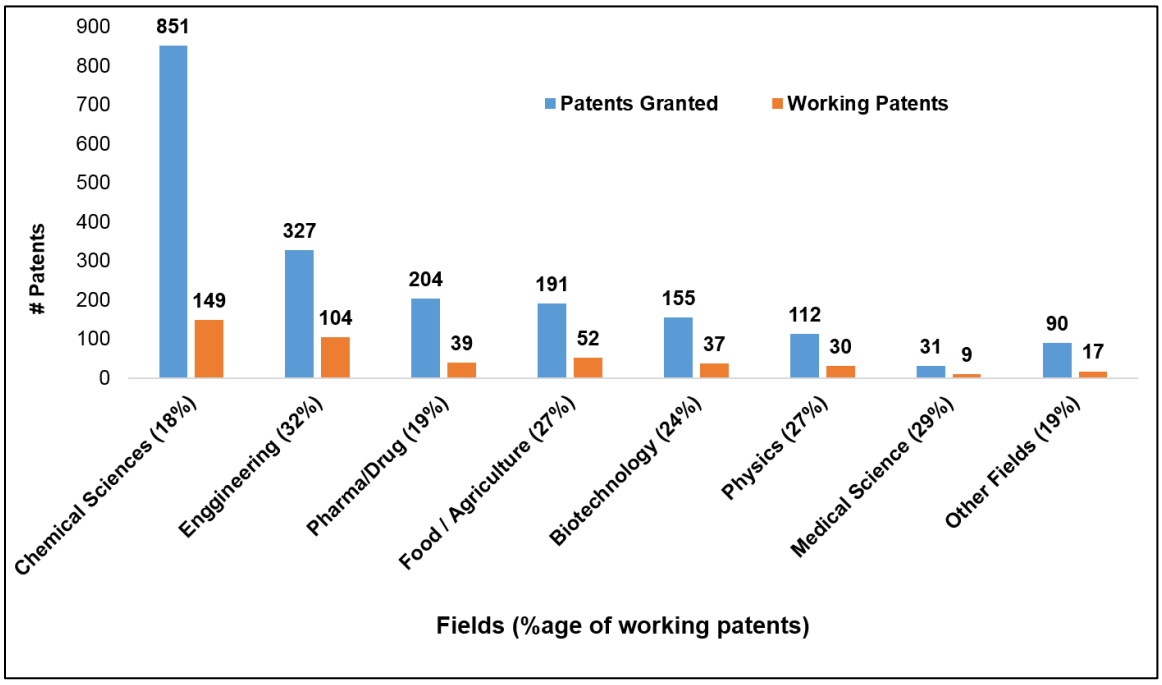


*A patent is **In Force** if the applicant is paying the annuity (renewal fee) for the patent in order to maintain it. A patent falls under the category of **Worked** if it has been licensed/ transferred or being exploited commercially by the patentee or the licensee*

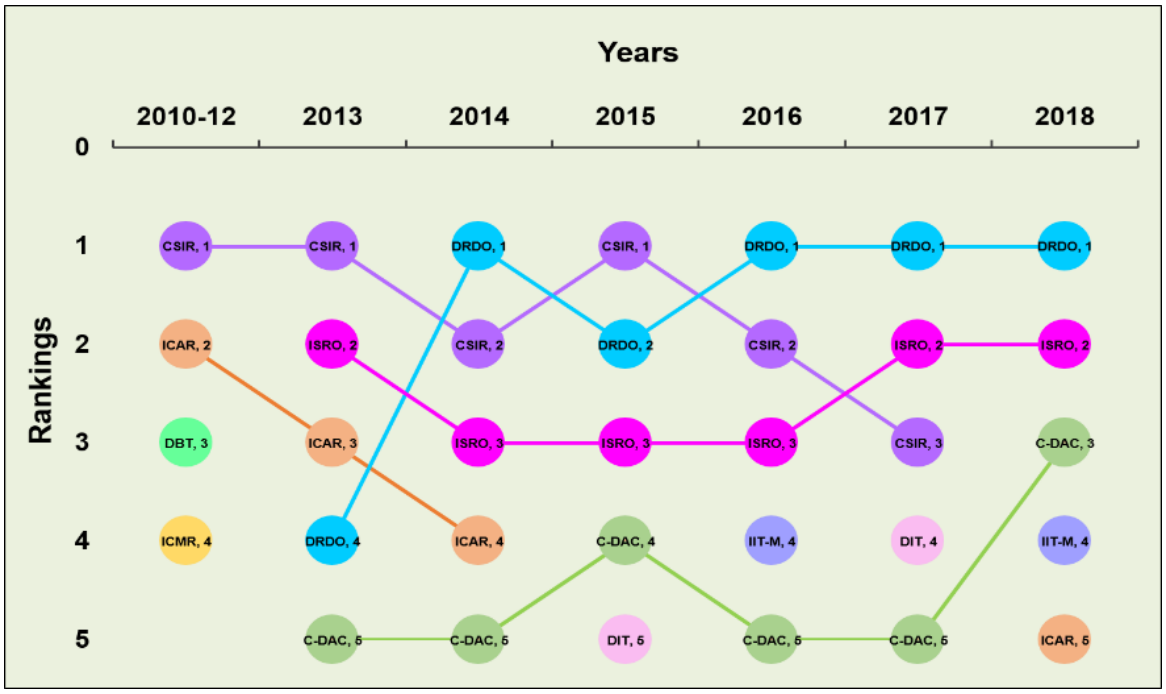
Top 10 Applicants based on Total #Granted Patents (1961) (Jan. 2010–Dec. 2017)



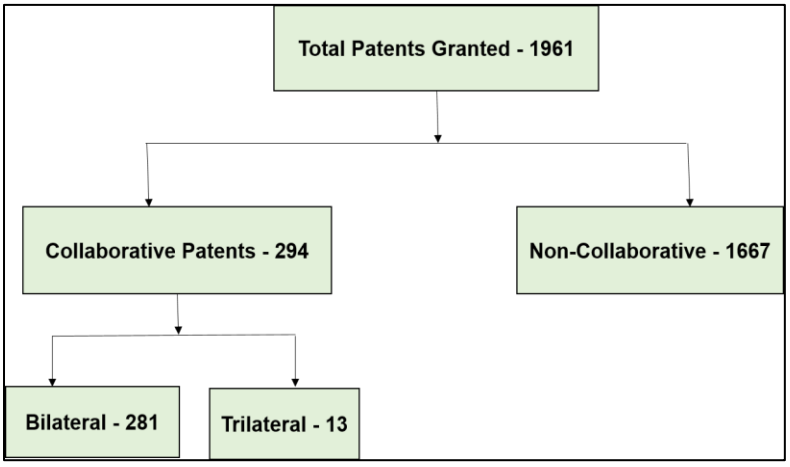
Field-wise Breakup (Patents Granted & Working) (Jan. 2010-Dec. 2017)



Ranking of Working Patents of 'Top 5 Applicants'



Collaborative Patents (Granted) (Jan. 2010 – Dec. 2017)



Collaborators (57) of Granted Patents of CSIR, New Delhi

HEIs (28)	NRLs (10)	Others (19)
• Alagappa University, Karaikud • Berhampur University, Berhampur • Goa University, Goa • IISc, Bangalore • IIT, Bombay • IIT, Delhi • IIT, Chennai • IIT, Guwahati • IIT, Kharagpur • Institut für Pharmazie und Biochemie, Germany • Institute of Chemical Technology, Mumbai • JNU, New Delhi • Laboratoire Chimie Des Materiaux Organiques Et Metalliques, France • Manipal Hospital, Bangalore • Nagpur University, Nagpur • National Institute of Advanced Industrial Science and Technology (AIST), Japan • Sree Chitra Tirunal Institute for Medical Sciences & Technology, Thiruvananthapuram • Sri Satya Sai Institute of Higher Medical Sciences, Bangalore • Thapar Instt. of Engg. & Tech., Patiala • University of Delhi (DU), Delhi • Institute of Structural Macrokinetics and Material Science (ISMAN), Russian Academy Of Sciences, Moscow, Russia • Jadavpur University, Kolkata • Technische University Darmstadt, Germany • BHU, Varanasi • Shriram Institute For Industrial Research, New Delhi • Mepco Engineering College, Virudhunagar • University Of Calcutta, Kolkata • Panjab University, Chandigarh	• Center For High Technology, Noida • DBT, New Delhi • DST, New Delhi • National Aerospace Laboratories, Bangalore • NML, Jamshedpur • Vikram Sarabhai Space Centre, Trivandrum • Department of Information Technology, New Delhi • Defence Research & Development Organisation, New Delhi • Department of Atomic Energy, Mumbai • Indian Association for the Cultivation of Science, Jadavpur	• Dabur Research Foundation, Ghaziabad • FDC Ltd., Nalagarh • Godfrey Philips India Ltd., Mumbai • Gujarat Narmada Valley Fertilisers & Chemicals Ltd., Gujarat • M/S Mesco Equipment (P) Ltd, Kolkata • MIR Holistic Pvt. Ltd, Kochi • National Aluminium Company Nalco Bhawan, Bhubaneswar • Nicholas Piramal India Ltd, Mumbai • NTPC Energy Technology Research Alliance, New Delhi • Petroleum Corporation Limited, Chennai • Ramakrishna Mission Medical Centre Free T B Clinic, Delhi • Reliance Industries Ltd, Mumbai • Ahmedabad Textile Industries Research Association, Ahmedabad • LMD Group of construction, Noida • National Research Development Corporation, New Delhi • Petroleum Conservation Research Association, New Delhi • Central Polution Control Board, New Delhi • National Mineral Development Corporation Ltd, Hyderabad (NMDC) • India Explosives (Gomia), Bokaro

Similar information of other organizations (DBT, ICAR, ISRO etc.) has also been carried out.

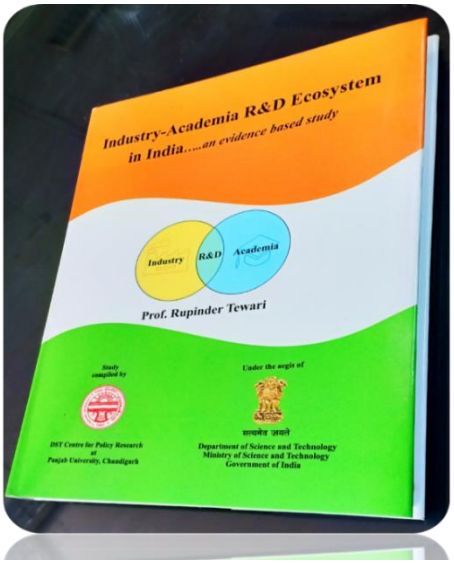
Reasons Mentioned for Not-Working patents:

Big chunk of the patentee had cited the same reason for the non-working status of patents i.e. *"Efforts made for commercialization, but unsuccessful"*. Other reasons cited are: *'Better technology available in the market', 'Lack of marketing support', 'Awaiting approval-transgenic material from GEAC', etc.*

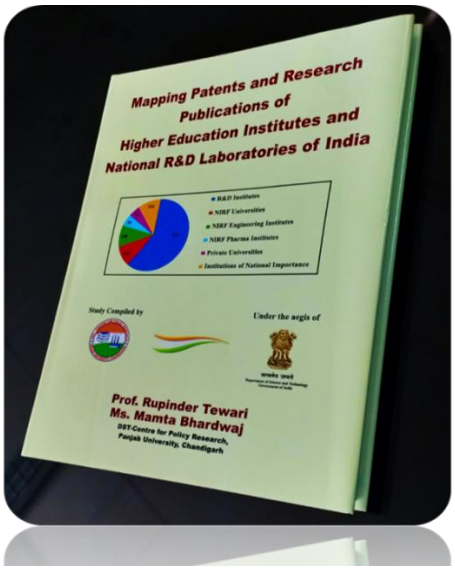
Recommendations

1. National research organisations, MHRD (AICTE and UGC) should have dedicated patent/technology commercialisation cells.
2. Form-27 needs modifications and should be strictly adhered to.
3. Awareness should be made about '**Compulsory License**' and should be practiced on serious mode.
4. Creation of '**Indian Patent Trust System**' on the lines of similar system operating in S. Korea.
5. Incentivisation of individuals who successfully execute technology commercialisation e.g. BIRAC Model, Gandhian Young Technological Innovation - SRISTI Awards.
6. Creation of a 'National Patent Web Portal' to disseminate information about existing technologies.

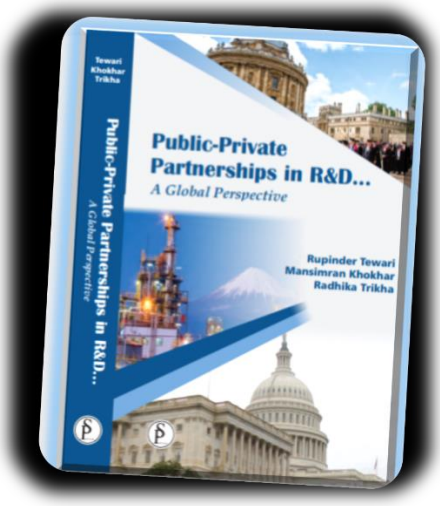
Books Published



Released in 2017 by Dr R Chidambaram, Fmr. Advisor to O/PSA, GoI



Released in 2018, by Hon. Harsh Vardhan ji, Cabinet Minister, S&T, GoI)



To be Released in March 2020

Reports Submitted to DST, GoI, New Delhi

(2014-15)

1. Comparative Study of Asian Economies: Lessons for India.
2. Foundation for Innovation and Technology Transfer (FITT): A Case Study on I-A Interface in India.

(2015-16)

1. Industry – Academia Programmes/Schemes of Public and Private Sectors.
2. Existing Models of R&D under Public Private Partnerships (PPP) Mode.
3. Patent Ecosystem of India Based on WIPO & IPO Indicators.
4. Case Studies on Feedback from Select Scientists Engaged in Industry – Academia Research Projects.
5. Industry – Academia R&D Regimes in Indian Institutes of Technology (IIT's).
6. Industry – Academia Related Questionnaire Survey Report of IIT's.

(2016-17)

1. Stimulation of Private Sector Investment in R&D: A Global Comparison.
2. Public Private Partnership Models for R&D (International).
3. Reforms in Higher Education for Strengthening Industry-Academia Interactions.
4. Patents and Research Publications of HEIs & R&D Institutions in India.

(2017-18)

1. Impact of Government Mediated R&D incentives on DSIR Recognized R&D Units (Pharma Sector)
2. Public Private Partnership Models for R&D (International-Part II).

(2018-19)

1. A working report on 8-member delegation to American Association for Advancement in Sciences (AAAS) at Washington DC, USA from Nov. 5-9, 2018 for AAAS Leadership Seminar in Science and Technology.
2. A working report on 7-member delegation to University of Sussex, UK for one-week workshop 'Science, Technology, Innovation (STI) Policy for Turbulent Times' held at University of Sussex, UK from June 17-21, 2019.
3. Public Private Partnerships (PPP) for R&D…A Global Perspective *(a book compilation).*

In Progress

4. Working Status of Patents Granted to HEIs and NRLs of India
5. BIRAC as a Successful Model for PPP in R&D.

Additional Activities Undertaken

1. A working Report on 'University-Industry Linkage Programme'

Upon UGC, GoI request to Prof. R Tewari, a draft of **'University-Industry Linkage Programme'** was submitted to UGC in April, 2019. This draft was duly vetted by a UGC appointed Working Committee. Prof. Tewari was one of the member-experts of the Working Committee. After inputs from various experts, UGC has submitted the Final-Draft to MHRD for further consideration.

2. Creation of CRIKC Industry-Academia Web Portal

(Created in 2017) ***Weblink: https://iacrikc.puchd.ac.in/***

3. Creation of Comprehensive 'Public Private Partnership for R&D' web Portal

***(In progress)* Weblink: https://ppprnd.puchd.ac.in/**

4. Creation of Medical Device Innovation Cluster (MDIC)

The HEIs and NRLs located in and around Chandigarh are engaged in applied research pertaining to Medical Devices. Hence, MDIC was created to act as a single window for industries engaged in the manufacturing Medical Devices. Every year a meet of MDIC is held, which sees active participation from the local industry and academia.

5. Workshops for Providing Hands-On-Training on ‘Patent Search’ & ‘Patent Filing’

6. Organized >25 Industry-Academia Roundtable Meets/Conferences/Seminars/Symposiums

All research should have as its aim service of humanity: Prof Kornberg

HT Correspondent
• chandigarh@hindustantimes.com

SAS NAGAR/CHANDIGARH: The fundamental of doing research should be a pursuit to serve humanity and any kind of rewards could just be a recognition to the work done by you. This was said by Prof Roger D Kornberg during his visit to the Chandigarh University on Thursday. The Nobel laureate addressed the session during Inspire 2017, an initiative by ministry of science and technology to increase the interest of school students to take science as a career.

Students of biotechnology, pharmacy and forensic sciences of University Institute of Pharma Sciences attended the session which was based upon the theme 'Importance of Basic Sciences and its Applications'. While advising the young research scholars, Prof Kornberg said, "Pursue research with absolute confidence and assurance that every new knowledge that you will find or possess will ultimately have its own benefit as no research can be initiated without the ultimate aim to deliver products and services that are relevant or importance to the mankind."

While replying to a question on generic medicines, he said that India can play an important role in creating and distributing medicines to the world at a very economical price as Indian scientists have all of the capabilities required to make medicines which are generic but effective and can counter the medicines produced by pharma companies. "I am a great opponent of the behaviour of the pharmaceutical companies in this regard and would not hesitate to challenge them," he added.


• Professor Roger D Kornberg interacting with students of Chandigarh University in SAS Nagar on Thursday. HT PHOTO

NOBEL LAUREATE VISITS CPR IN PU

Roger David Kornberg also made a special visit to the Centre for Policy Research (CPR) established by department of science and technology at Panjab University on Thursday.

Prof Kornberg appreciated the initiative of government to set up such a centre and shared his experiences in the domain of public-private research and development (R&D) partnership as he himself was not only a top notch academician-cum-scientist, but also director of many biotech companies.

He stressed on the need for bridging the gap between industry and academia, as according to him, both sectors are like two wheels of the chariot representing the economic and societal development. He said that companies in the US focus and fund R&D themselves, limiting the horizons of research in industry-specific needs.

However, prof Kornberg disagreed with the prevailing thought that scientists can do either fundamental research or applied research. He gave his own example to disprove the proponents of this theory. During an interaction with prof Rupinder Tewari, coordinator, DST-CPR, and other scientists of the centre, prof Kornberg categorically stated, "The government and private sectors, especially the industrial ones, should lay more emphasis on fundamental research as it is the starting point of applied research and technology." The Nobel laureate was delighted to receive a book published by DST-CPR entitled Industry-Academia R&D Ecosystem in India.

Experts meet at Panjab University to bridge gap between industry, academia

EXPRESS NEWS SERVICE
CHANDIGARH, NOVEMBER 12


Delegates during the meeting in Chandigarh Saturday. Express

IN A bid to bridge the gap between industry and academia, DST—Centre for Policy Research at Panjab University, in association with CSIR-CSIO and Chandigarh Region Innovation and Knowledge Cluster (CRIKC) organised an industry-academia meet.

Inaugurating the meet, Professor Arun Grover, Vice-Chancellor, Panjab University, highlighted the achievements of CRIKC and informed the gathering of creating many industry-academia interfaces, on the lines of Medical Device Innovation Cluster (MDIC), in collaboration with CII, Chandigarh.

Dr Dinesh Dua, Chairman, CII Council, Chandigarh, endorsed the views of Grover and assured full support in making Chandigarh as one of the leading centres of industry-academia interactions. Professor R K Sinha, Director, CSIR-CSIO, Chandigarh and co-host of the event highlighted the contribution of CSIO in developing innovative medical devices for society.

Dr G D Puri emphasised the need of MDIC and elaborated on various medical devices developed in his laboratory at PGIMER in collaboration with industries. He also apprised his endeavours to bring a DST-sponsored innovation hub in PGIMER.

The scientists from various institutes of CRIKC (CSIR-CSIO, IMTECH, PEC University of Technology and IIT-Ropar) and representatives of medical device industries (Tynor Orthotics Pvt Ltd, Mohali, Clarity Medical Pvt Ltd, Mohali and Advanced Tech India Pvt Ltd, Zirakpur) highlighted their R&D activities being carried out in the domain of medical technologies. The industry representatives also opined their expectations from the scientists of CRIKC to work collectively to fulfill the dreams of "Make in India" drive in India.

The last session was on "Strengthening Industry-Academia Interface" in which prominent personalities like Prof Sarit Das, Director, IIT-Ropar; Dr Ashok Ganguli, Director, INST Mohali; Dr R S Sangwan, CIAB, Mohali; Dr Rakesh Tuli, former director, NABI Mohali, Prof Arun K Grover and Prof RK Sinha laid down the road map for the functioning of MDIC as well as creation of similar industry-academia clusters in the areas of engineering and biological sciences.

It was also decided that MDIC will hold regular meets in various institutions of CRIKC and set up a nodal centre in one of the CRIKC institutions, for smooth functioning of MDIC.

Harsh Vardhan releases book on patents, research publications

TRIBUNE NEWS SERVICE
CHANDIGARH, MAY 11

Union Cabinet Minister Dr Harsh Vardhan has released a book titled 'Mapping of Patents and Research Publications of Higher Education Institutes and National Research Laboratories', which is authored by Prof Rupinder Tewari and Mamta Bhardwaj, scientists at DST-Centre for Policy Research at Panjab University.

The book was released at Delhi. The highlight of the book is a study on the research and patent profiles of more than 900 institutes for seven-year period (2010-16). The study included all national research laboratories (553 in number) and 351 institutes of higher education based on the NIRF criteria.

DU tops in number of publications

- Delhi University tops in the number of research publications with 15,052 publications, but has only 26 patents granted.
- The PGIMER is at number 18 with 5,380 publications, but only one patent granted. In medical the science category, PGIMER is at number 2 with 5,046 publications, but has only one patent granted.
- Panjab University is at number 18 with 4,733 publications and has two patents granted. In the physics category, the PU is at number 9 with 1,783 publications but no patent has been granted. In the engineering category, the PU is at number 33 with 647 publications, but no patent granted.
- In pharma and drug category, NIPER Mohali is at number 45 with 195 publications, but 10 patents granted. The PU is at number 15 with 591 publications and two patents.

(Data from 2010 to 2016 analysed)

Institute	Number of publications	Number of patents
Delhi University	15,052	26
Indian Institute of Science, Bengaluru	10,852	174
IIT Kharagpur	8,724	10
Banaras Hindu University	8,140	3
BARC, Mumbai	7,887	16
University of Hyderabad	7,849	5
AIIMS	7,634	31
IIT Delhi	7,148	56
IIT Madras	6,440	48
IIT Bombay	6,300	100
VIT University, Vellore	6,267	3
IIT Roorkee	6,028	1
IIT Kanpur	5,622	44
Annamalai University, Chidambaram	5,400	1
IIT Hyderabad	5,938	2
PGIMER, Chandigarh	5,380	1
Gujarat University	4,871	0
PU Chandigarh	4,733	2
Aligarh Muslim University	4,588	2
Indian Institute of Chemical Technology, Hyderabad	4,534	76

(National Chemical Laboratory, Pune is at 26th place with 3,232 research papers but 114 patents)

7. International Experiential Visits on 'Science Policy and Leadership'

- Coordinator, DST-CPR at PU, Chd. coordinated the visit of an 8-member delegation to **American Association for Advancement in Sciences (AAAS)** at Washington DC, USA from Nov. 5-9, 2018 for **AAAS Leadership Seminar in Science and Technology**.

  Prof. Rupinder Tewari, Coordinator, DST-CPR at PU, Chd. and Dr. Radhika Trikha, DST-STI-PDF fellow were part of Delegation
- Coordinator, DST-CPR at PU, Chd. coordinated the visit of a 7-member delegation to **University of Sussex, UK** for one-week workshop '**Science, Technology, Innovation (STI) Policy for Turbulent Times**' held at University of Sussex, UK from June 17-21, 2019.

  Prof. Rupinder Tewari, Coordinator, DST-CPR at PU, Chd. and Dr. Mansimran Khokhar, DST-STI-PDF fellow were part of Delegation.

8. Invited National and International Talks

2nd China-India Science, Technology and Innovation (STI) Joint Research Workshop Dec. 16 18, 2019 CASTED, Beijing, China **Talk on:** Strengthening Innovation Ecosystem in Developing Countries: Working in Systems, not Silos **Presenter:** Prof. Rupinder Tewari, Coordinator	**Asian Society for Innovation and Policy (ASIP) 9th Conference on Technology and Innovation for SMEs** Oct. 3-5, 2019 University of Philippines Diliman, Manila **Talk on:** BIRAC – a successful PPP model for stimulating innovations (SMEs) **Presenter:** Prof. Rupinder Tewari, Coordinator
3-day conclave organized by Zaheer Science Foundation, New Delhi on 'Innovation-driven economic growth in Asia focussing on India' Nov. 27-29, 2019 Goa University, Goa **Talk on:** ➢ Government Mediated Stimulation of Private Sector's R&D ➢ A Case Study on Strengthening Translational Research Ecosystem in India **Presenter:** Prof. Rupinder Tewari, Coordinator; Dr Radhika Trikha, Sr Scientist D and Ms Mamta Bhardwaj, Sr Scientist C	**Indian Technical and Economic Cooperation (ITEC) training program on Biopharmaceuticals** Aug. 29, 2019 NIPER, Mohali **Talk on:** Strengthening Industry-Academia R&D Regime in Developing Countries **Presenter:** Prof. Rupinder Tewari, Coordinator; Dr Radhika Trikha, Sr Scientist D and Dr Navkiran Kaur, Sr Scientist C
Society for Promotion of Science, Technology and Innovation May 18, 2019 **Talk on:** Industry-Academia R&D Ecosystem in India **Presenter:** Prof. Rupinder Tewari, Coordinator	**Workshop-cum-Brainstorming Session on STI for 'Make in India': Promoting Manufacturing and Job Creation at District Level** Feb, 28 2018, MGSIPA Complex, Chd. **Talk on**: Enhancing the Innovation Capacity and Competitiveness of Industries **Presenter**: Dr Mansimran Khokhar (DST-STI-PDF)

Recommendations Carried Forward at the National Level

The Centre has persisted on its recommendations through diverse platforms, such as conferences, roundtable meets, invited lectures, publication of books, research articles and reports. *Some of these recommendations, as mentioned below, have gradually found acceptance by the funding agencies.*

Since 2014, the Centre, has been reiterating the need to broaden the **scope of CSR funds for R&D activities**. Ministry of Commerce and Industry has recently declared R&D investments by the private sector as an activity under CSR funds.

Based on the studies on American and European PPP Models, the Centre had suggested positioning of '**Moderators**' between Industry and Academia, which has now taken form as **Technology Enabling Centres**, **a DST initiative** to act as a facilitator for I-A connect with emphasize on commercialization of technologies arising

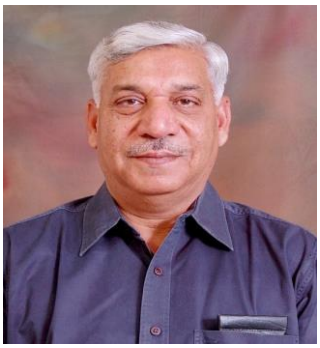
In order to stimulate the culture of innovation in India it is imperative that higher education institutes, national research labs and industries residing in particular region should actively interact with each other. This can only happen if they form a cluster to pool resources (intellect, instruments and other infrastructural facilities) for progressing technology driven societal problems, solving R&D issues of industries, conducting quality research, strengthening teaching programmes and promoting the spirit of entrepreneurship.

In 2013, Prof. R Tewari (Coordinator, DST-CPR) along with Prof. Arun K Grover (Fmr.Vice Chancellor, PU, Chd.) created Chandigarh Region Innovation and Knowledge Cluster (CRIKC) comprising of over 25 institutes of higher learning and national research labs. CRIKC also acts as a single window for the industry. The **Office of PSA** (O/o PSA) has recently initiated the creation of **'City Clusters'**. Prior to this Prof. K VijayRaghavan (PSA to GoI) and Dr Arbindra Mitra (Scientific Secretary, O/o PSA) visited CRIKC. On behalf of CRIKC, Prof. R Tewari made presentations in Pune and Calcutta for setting up of 'Regional Knowledge Clusters'.

Future Work

1. **Case Studies** on following for enhancement of PPP in R&D.
    i) **Top 10 HEIs in India: IITs**:- IIT-Madras; IIT-Mumbai and IIT-Delhi; **State Universities/Institutes**:- ICT-Mumbai; Panjab University, Chandigarh and Anna University, Chennai and **Private Universities**:- JSS Academy, Mysore; Amrita Vishwa Vidyapeetham, Coimbatore and KIIT, Bhubaneswar.
    ii) **Research Parks:** IKP Knowledge Park, Hyderabad and IIT-Madras Research Park
    iii) **Incubators:** Venture Centre, Pune and KIIT-TBI, Bhubaneswar
2. Impact Assessment of **Public Private Partnership (PPP) Programmes for R&D, floated by Ministry of Science & Technology, GoI**
3. In Depth Study of **Select International Programmes/Schemes for Public Private Partnership (PPP) for R&D**.
4. Prepare '**White Paper Draft**' on evidence based Best Practices/Guidelines for enhancing PPP in R&D.
5. Preparing **IPR Toolkit** for colleges and universities.
6. Formulation of '**Technology Transfer Guidelines**' for the universities.
7. **Case Studies** in the field of IPRs:
    a) Top 5 Scientists; b) Top 5 Industries; c) Top 5 R&D units and d) Top 5 HEIs.

Scientific Staff, DST-Centre for Policy Research at PU, Chd.



Prof. Rupinder Tewari,
Department of Microbial Biotechnology
Coordinator, DST-Centre for Policy Research, PU, Chd.
&
Chair-IPR, PU, Chd.

From L to R: Ms Amandeep Dhindsa (Scientific Officer), Dr Mansimran Khokhar (Post-Doctoral Fellow), Ms Mamta Bhardwaj (Sr. Scientist C), Dr Navkiran Kaur (Sr. Scientist C), Dr Radhika Trikha (Sr. Scientist D), Ms Sukriti Paliwal (Scientific Officer)

DST-Centre for Policy Research at Panjab University, Chandigarh

Top Floor, Aruna Ranjit Chandra Hall, Near Post Office,

Panjab University, Sector 14, Chandigarh – 160014

https://cpr.puchd.ac.in/

Email: dstprc2014@pu.ac.in; Contact No.: 0172-2534124