

Webinar Report

Accelerating Joint R&D between India and Japan

Automotive Industry Consulting Group

NRI Consulting & Solutions India Pvt. Ltd.

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Premium Institutes in India

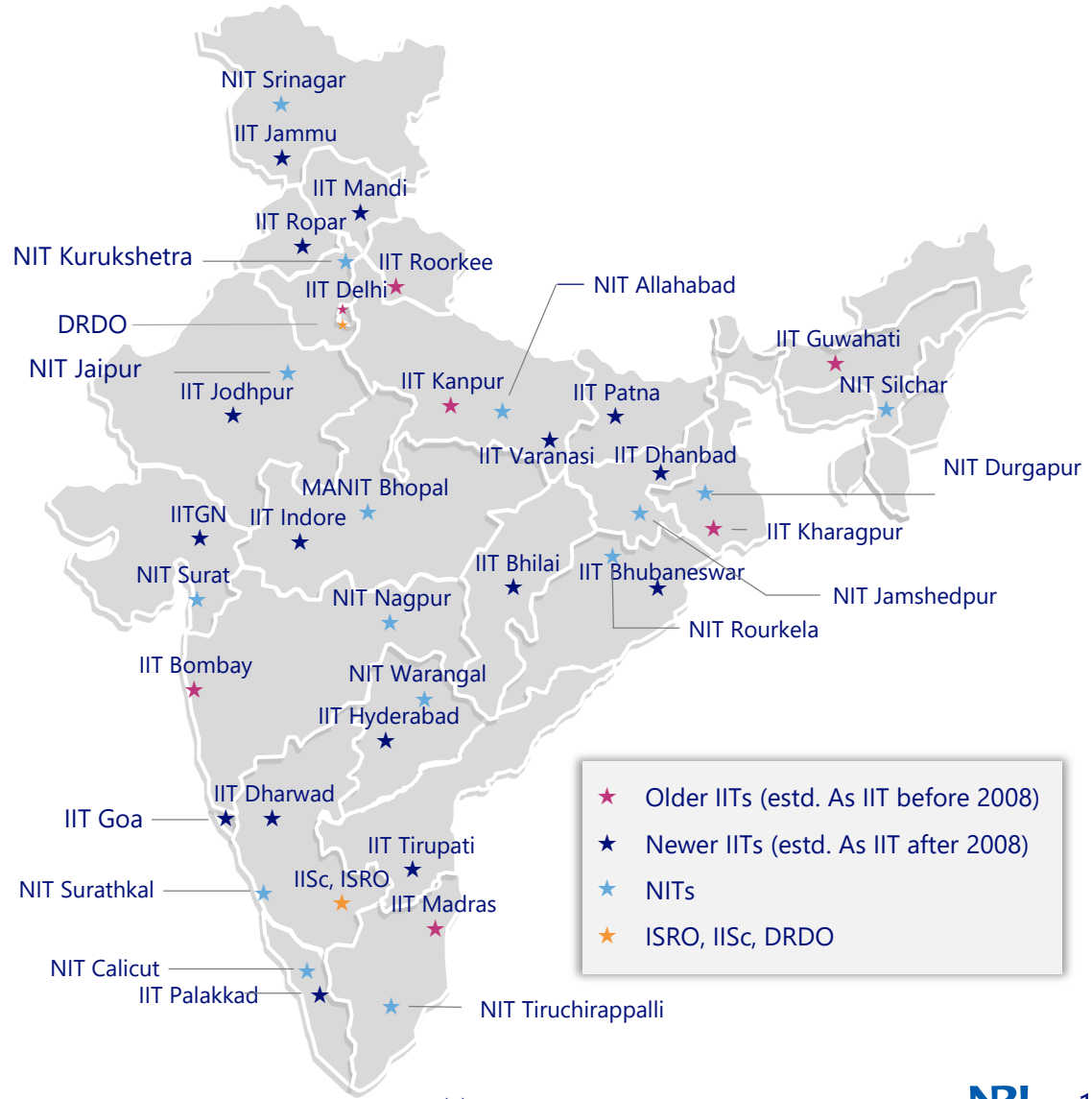
India has many R&D institutes across the length and breadth of the country. 41 premier institutes were studied for their international collaboration

41 Institutions and research organizations covered

23 Indian Institutes of Technology (IITs)






15 National Institutes of Technology (NITs)

3 Others (IISc, ISRO, DRDO)



Benefits of Collaboration with India

India houses a robust research infrastructure providing benefits of cost savings, access to a devoted workforce with diverse backgrounds

Benefits	Details
 Cost Savings: Lower cost of talent	<ul style="list-style-type: none">• The cost of hiring a researcher in India is one-fifth of that in the US• Annual salary of a researcher in the US is in the range of USD 60,000-75,000, while it is about USD 12,000-15,000 in India
 Robust Academic and Research Infrastructure	<ul style="list-style-type: none">• Over 1,140 centers in India are dedicated to R&D which employ over 900,000+ professionals
 Diverse Intellectual Capital	<ul style="list-style-type: none">• India adds 6000 PhDs, 200k engineers, 300k non-engineer postgraduates, and 2.1 Mn other graduates to its workforce annually
 Devoted Workforce	<ul style="list-style-type: none">• Indian graduate works on average for 2,350 hours a year, much higher as compared to US and German counterparts, who work for 1,900 and 1,700 hours, respectively
 Massive Startup Ecosystem	<ul style="list-style-type: none">• India is the third-largest startup ecosystem in the world after the US and China with 14,000 recognized new startups in 2021-2022• Investing in tech startups helps companies obtain breakthrough innovations with a shorter time to market, diversify and mitigate risks, as well as reduce costs

Status of R&D Collaboration

Old IITs & IISc have more than 100 international R&D collaborations each in last five years; New IITs and NITs are increasing their R&D focus

Institutes	International Collaboration	Details
Old IITs	<p>~200 International R&D projects each (2015-20)</p> <p>Industry & Academia engagements</p>	<ul style="list-style-type: none"> USA contributes highest to joint R&D projects Followed by UK, Canada, Japan, Germany, Australia Japanese organisations have ties with all old IITs, & top collaborators for IIT Guwahati
New IITs	<p>~50 International R&D projects (2015-20) (IITI, IITH, IITGN)</p> <p>~10 International R&D projects (2015-20) (other IITs)</p>	<ul style="list-style-type: none"> US and Japan are the top collaborators for joint R&D Japanese institutions and organisations are the top collaborators for IIT Hyderabad
IISc	<p>~140 International R&D projects (2015-20)</p>	<ul style="list-style-type: none"> Collaborations mainly include academic engagements USA contributes the highest to joint R&D projects
DRDO & ISRO	<p>Funds R&D projects at IITs, NITs, IISERs and IISc</p>	<ul style="list-style-type: none"> No international R&D collaboration data publicly available
NITs	<p>~15 International R&D projects (2015-20) (NIT Trichy, Surathkal, Jaipur, Durgapur)</p> <p>~5 International R&D projects (2015-20) (other NITs)</p>	<ul style="list-style-type: none"> USA contributes to majority of joint R&D projects Trichy, Surathkal, Jaipur and Kurukshetra are the only NITs having projects with Japanese universities (~1 each)

Status of Start-up Support

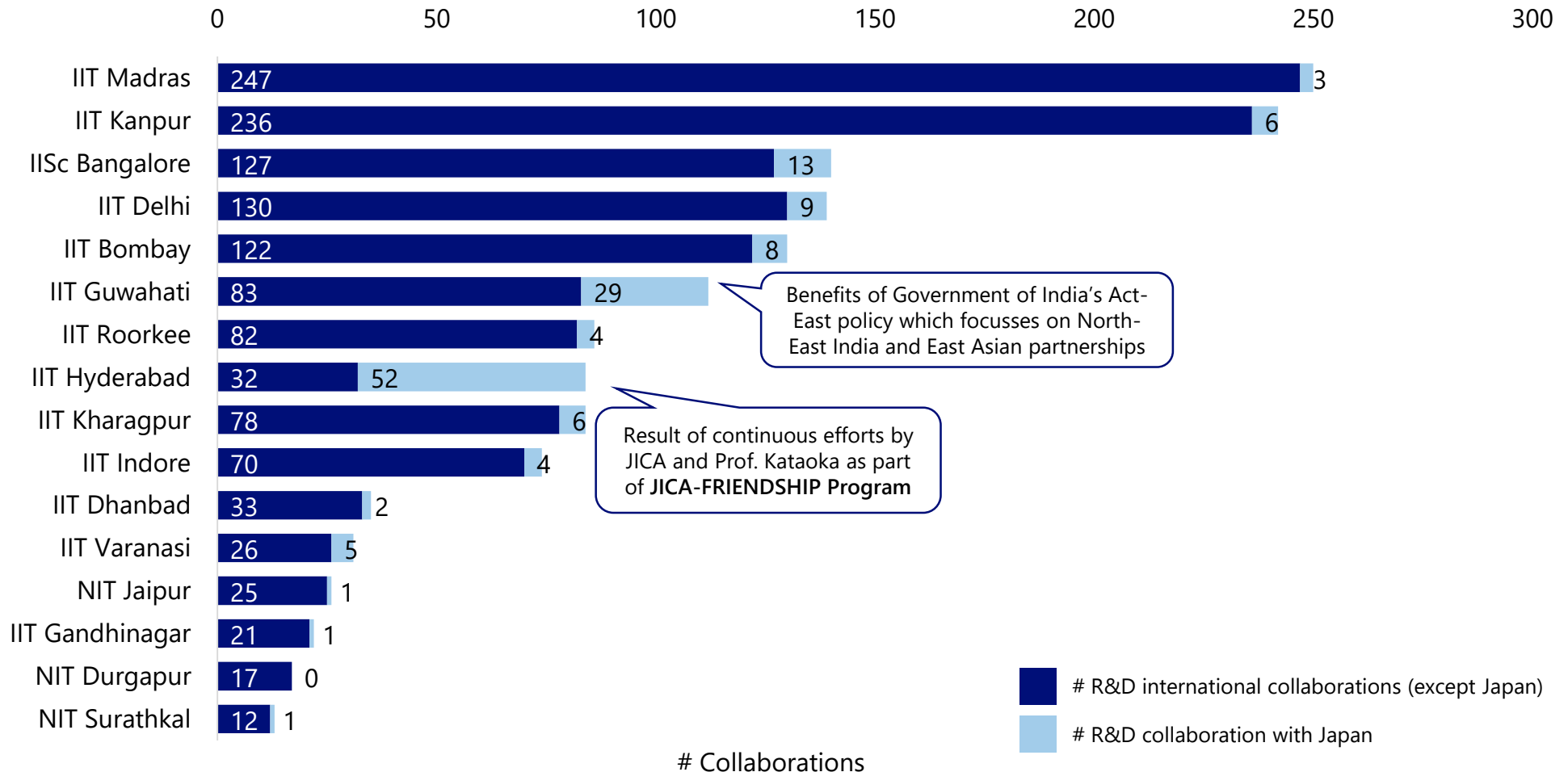
Old IITs are large producers of tech-based start-ups with multiple incubators and public & private sector involvement including international funding sources

Institutes	Key Statistics	Details	
Old IITs	<p>750+ Associated start-ups as of 2022</p> <hr/> <p>MedTech, AI & IoT Key focus area</p>	<p>INR 59B+ Funding raised based on just 2 IITs</p> <hr/> <p>Public & Private Sector Funding received</p>	<ul style="list-style-type: none"> The old 7 IITs involve a mix of government schemes, private sector involvement and multiple in-house incubators covering wide areas No specific focus area for the incubators, however, based on available data, Medical Technology is the most prominent space IIT Madras leads with over 200 incubated start-ups attracting funding from international agencies including Japan
New IITs	<p>200+ Associated start-ups as of 2022</p>	<p>INR 12.8M+ Funding support at IITBHU</p>	<ul style="list-style-type: none"> IIT BHU leads followed by IIT Gandhinagar and IIT Patna Majority have a single incubation cell Source of funding could not be tracked
IISc	<p>21 Incubated start-ups as of 2022</p>	<p>Deep Science Start-ups Key focus area</p>	<ul style="list-style-type: none"> 3 Incubation cells with support from public & private sector Prominent area include Nanotechnology & Biotechnology
NITs	<p>330+ Associated start-ups as of 2022</p>		<ul style="list-style-type: none"> NIT Surat followed by Jaipur & Calicut contribute 80%+ to the associated start-ups including current incubates Majority have a single incubation cell

Joint R&D: Rest of World v/s Japan

Institutes have large number of international collaborations but the number of collaborations with Japan is limited except for IIT Hyderabad and IIT Guwahati

Institute wise R&D Collaborations



Note:

- Only institutes with non zero international R&D collaborations have been included
- Data for years 2015-2021

Source: IIT Council & Institute Websites

Joint R&D: Strong Collaboration with the West - Reasons

US and European countries have higher collaborations with Indian institutes due to faculty personal connections, proactive agencies and language overlap

	Awareness	Connection	Collaboration
Country	<p>Proactive Agencies</p> <p>Organizations like DAAD actively reach out for information dissemination</p>	<p>Established Schemes</p> <p>Well developed, advertised and resourceful schemes to benefit from</p>	<p>Language Comfort</p> <p>English is a primary or secondary language and is comfortably used as medium of communication</p>
Institute/ Industry	<p>Scholarships</p> <p>Alumni, legacy, industry run scholarships to encourage participation</p>	<p>Alumni Network</p> <p>Presence of past students and colleagues in academia and industry establishing strong alumni network</p>	<p>Past Experience</p> <p>Past collaborations reduce uncertainties and hurdles caused due to paperwork and admin related activities</p>
Faculty	<p>R&D Overlap</p> <p>Active R&D related discussions due to similar focus areas of research</p>	<p>Faculty Connections</p> <p>Colleagues and co-researchers during higher studies/post doc. research catalyze joint R&D collaborations</p>	<p>Way of Working</p> <p>Comfortable and understanding developed about counter-party's way of working</p>

Joint R&D: Strong Collaboration with West - Case Studies

Case of IUSSTF, IITGN-Caltech and RBC-DSAI at IITM are three successful models of collaboration with the West

	Awareness	Connection	Collaboration
Bilateral Case: IUSSTF	Government Facilitation Established via agreement between the Governments of India & the USA in March 2000 to formalize the 5 decade old relationship in S&T	Nodal Agency IUSSTF promotes, catalyzes & seeds bilateral collaboration in science, engineering & innovation via interactions of government, academia & industry	Impact <ul style="list-style-type: none">• 15,000+ Scientific Project Beneficiaries• 1,638+ Interns & Fellows supported• 522+ Post-doc fellows nurtured• 10+ Sectors supported
Academia Case: IITGN ¹ - Caltech	Faculty Connection Prof. Sudhir, then Director of IITGN had completed his studies from Caltech Prior connection facilitated collaboration	Strengthened Alumni Network <ul style="list-style-type: none">• Multiple IITGN students pursue higher studies at Caltech• 10 Caltech students learn about Indian culture, arts, politics & tours each year	Student Exchange 10 students from each university participate in student exchange per year 1 SURF in Caltech 2. India ki Khoj in IITGN
Industry Case: RBC-DSAI ² IITM ³	R&D Overlap RBCDSAI Centre was set up in 2017 as an outcome of the Interdisciplinary Laboratory for Data Science (ILDS) at IITM	Strengthened Network Center's mandate requires interaction with industry and other universities , including international student & faculty exchanges	Implementation Plan Bosch to invest 2.5 million Euros over five years in the centre (2019-2024) Centre to undertake foundational research in many areas of AI and Data Science

Note:

1. IUSSTF - Indo-US Science and Technology Forum

2. IITGN: IIT Gandhinagar

3. RBC-DSAI: Robert Bosch Centre for Data Science and Artificial Intelligence

4. IITM: IIT Madras

Joint R&D: Challenges in Collaboration with Japan

For collaboration with Japan, the key challenges are - lack of awareness of research opportunities, fragile connections, and funding and language barriers

Awareness



Limited Information Dissemination

Absence of common platforms and/or forums for regular sharing of information



Lack of familiarity about research in both countries

Ignorance about research areas and work being done in other countries limits active discussions and engagements



Ignorance on Collaboration models

Lack of knowledge on ways of collaboration limits outreach and plans for joint R&D

Connection



Lack of Faculty Connections

Limited faculty connections in Japanese institutes as most researchers in India pursue higher studies in the West



Fragile Alumni Network

Strong alumni network helps in establishing connects and initiating discussions for potential future collaborations



Lack of Industry Network

Limited job opportunities in Japan result in fewer Indians joining the Japanese industry and hence, lesser R&D outsourcing to Indian univ.

Collaboration



Lack of Funding and Resources

Shortcomings in funding and resources one of the major hurdles for meaningful and long term joint R&D collaboration



High Language Barriers

Cultural dissimilarities and lack of comfort in using English fluently as medium of communication



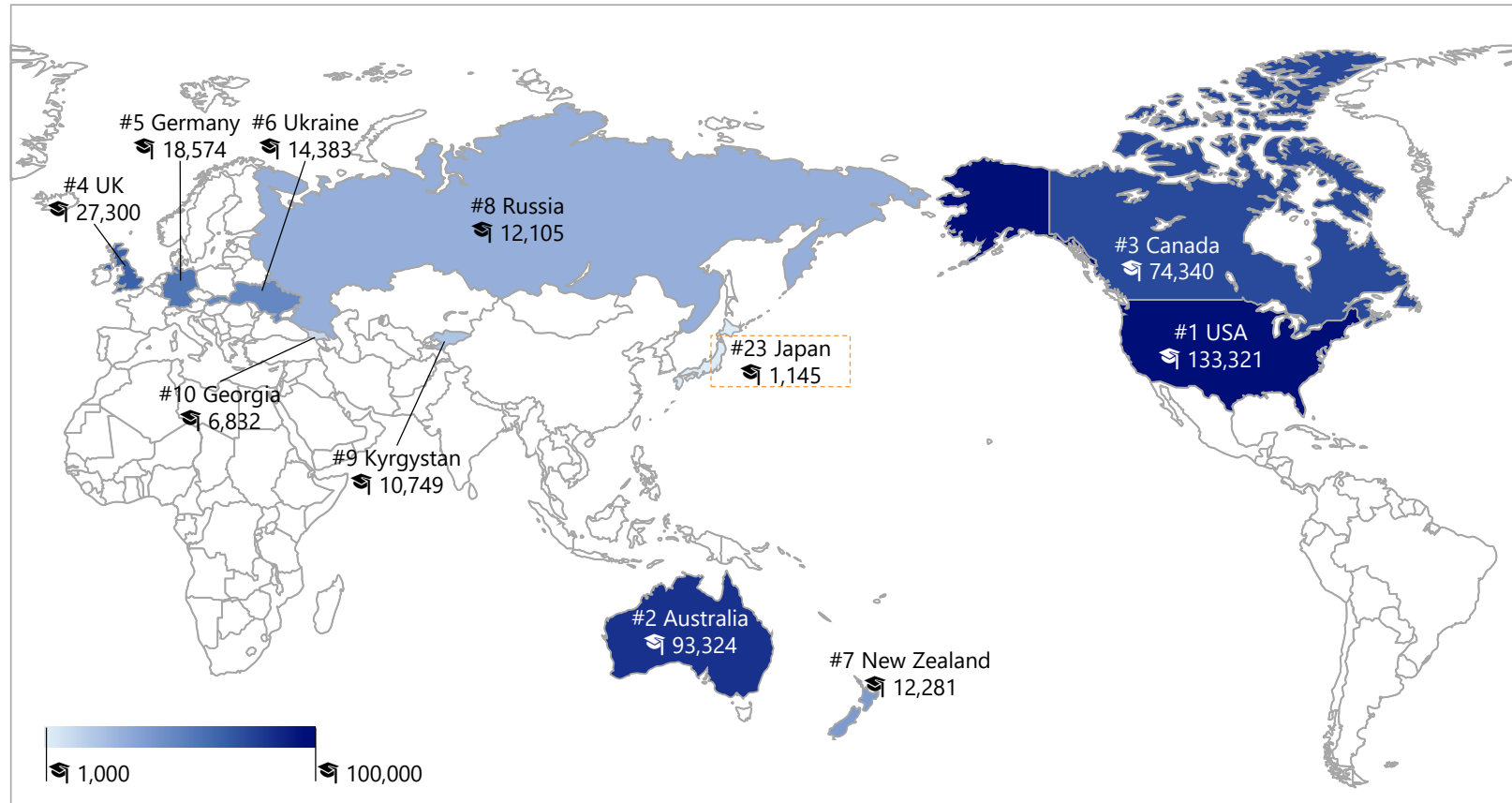
Absence of a Central Nodal Agency

No one single point-of-contact to reach out for assistance for any funding, regulatory or admin related issues

Student Exchange: Outbound Students from India

Outbound Indian students are highest in US, Australia & Canada while Japan lags far behind at 23rd rank with just ~0.25% of total outbound students from India




Indian Outbound Students (Top 10 nations + Japan)









Multiple agencies from Japan have various policies and schemes that can be leveraged to increase collaborations with Indian institutes across domains

Agency	Support Programs	Details
JST	Collaboration Hubs for International Research Program (CHIRP)	<ul style="list-style-type: none"> India (DST)-China-Japan Jointly funded collaborative research Research leaders (faculty) are appointed from representing universities
	SATREPS	<ul style="list-style-type: none"> Partnership of JST and JICA JST provides funding for Japanese side, JICA provides financial support for developing nations
	SICORP	<ul style="list-style-type: none"> JST works as an intermediary between MEXT and Japanese Side and cooperates with its counterpart agency abroad Proposals are initiated from MEXT, JST provides funding only for Japan side
	Sakura Science	<ul style="list-style-type: none"> Host Industry/University prepares short-term programs < 3 weeks JST selects program and funds travel and stay for selected applicants
JSPS	IJCSP (Indo-Japan Cooperative Science Programme)	<ul style="list-style-type: none"> India (DST) - Japan calls for proposals for research projects and workshops Mutually agreed areas from Basic sciences, Materials and Engineering COVID-19 related technologies
JICA	Technical Cooperation Project with IITH	<ul style="list-style-type: none"> Establish a platform for further collaboration Student exchange, Collaborative Projects and Funding to enhance R&D and Industrial collaboration
NEDO	R&D Program for Promoting Innovative Clean Energy Technologies	<ul style="list-style-type: none"> Funding for Japanese Research Institutes conducting collaborative research Program incentivizes collaborative research from Japan Side towards developing energy saving, environment friendly green technology

Various policies and schemes have specific focus areas and intervention that can be leveraged to increase collaborations with Indian institutes across domains

Support Programmes	Domains	Details
Scheme for Promotion of Academic & Research Collaboration (SPARC)	 Multidisciplinary	<ul style="list-style-type: none"> • Visits and long-term stay of top international faculty • Visits by Indian students for training and experimentation • Joint development of niche courses
Global Initiative of Academic Networks (GIAN)		<ul style="list-style-type: none"> • Jointly supervised lectures and courses
Visiting Advanced Joint Research (VAJRA)		<ul style="list-style-type: none"> • Overseas research internships for students • Research programs for scientists and faculty
India-Japan Education Program (IJEP)	 Information & Communication Technology	<ul style="list-style-type: none"> • Intensive courses; Remote teaching • Joint short term programs • Internships & Joint degrees
India-Japan Joint Research Laboratory Programme		<ul style="list-style-type: none"> • Funding support for Collaborative Research Projects
Asia Pacific Network (APN) for global change research Grant		 Climate & Environment

JICA Friendship program is a successful case that effectively created long-term collaboration and reaped stellar results

	 Awareness 2007-2012	 Connection 2012-2020	 Collaboration Future Plans 2022-2025
 Key Success Factors	Government of India was seeking out support for funding new IITs	Prof. Kataoka championed the coordination between the institute and agencies	Establishment of “Hubs” connecting both industry and academia to increase collaboration
 Activities	IITH infrastructure financing by JICA	<ul style="list-style-type: none"> Scholarships R&D visits MoUs & job opportunities with Japanese Industries 	<ul style="list-style-type: none"> Doctoral scholarship programs Joint research grants
 Achievements	<ul style="list-style-type: none"> ODA loans for campus development 6/19 building designed by Japan through JICA 	<ul style="list-style-type: none"> 136 students availed scholarships 271 faculty visits conducted 13 MoUs with Japanese Companies signed 	<ul style="list-style-type: none"> 30 doctoral students scholarship Japan Desk 18 Joint projects within 2 years

IITH and Suzuki Motor join hands to establish Suzuki Innovation Center (SIC) to further the industry and academia collaboration between India and Japan



Awareness



Connection



Collaboration

2022 - Future Plans



Activities

- Suzuki Innovation Center (SIC) at IIT Hyderabad is a result of cumulative success stories between Suzuki Motor Corporation and IIT Hyderabad over the years
- Alumni of IIT Hyderabad -- Vipul Nath Jindal and Prathyusha Thammineni, have led the whole initiative from ground-up

Philosophy of the programme:

- Create inclusive value for the Indian & Japanese societies
- Support **skill development** and **exchange of human resources** between India and Japan

- IIT Hyderabad and Suzuki to work closely to **identify and address** broad challenges on and beyond mobility
- A **3-year contract** has been signed to start (SIC) which will be operated as a platform for open innovation among **industries, academia, and startups**

Enhancing Indo-Japan Joint R&D: Recommendations

Increasing dialogue, dissemination of information and higher networking between researchers are some of the key recommendations for enhancing joint R&D

⦿ High ○ Medium △ Low

Targets of Recommendation

	Recommendation	Description	Current Status	Targets of Recommendation		
				Academia	Industry	Govt.
Awareness	Conduct Information Dissemination sessions	<ul style="list-style-type: none"> Magazines/articles/online events including success stories & achievements for increasing awareness of Japanese R&D progress and efforts 	△ No organized efforts with regards to Japan	✓		✓
	Conduct Academic Events	<ul style="list-style-type: none"> Promote awareness and networking through <u>seminars, conferences and workshops</u> Promote <u>cross-publication</u> of research journals 	△ Being organized by different agencies but not continuous; Less compared to West	✓	✓	
	Facilitate Industry visits	<ul style="list-style-type: none"> Organise <u>one-to-one industry visits</u> (one industry, one Indian institute) as industry collaborations are confidentiality bound 	○ Need to be increased with Japan and its Indian counterparts		✓	✓
Connection	Address Language Barriers	<ul style="list-style-type: none"> Caution for the usage of a <u>common language of instruction (English)</u> for Indian students and scholars at Japanese institutions 	△ Japanese is the current medium of instruction across Japan	✓		✓
	Promote Mobility Programs	<ul style="list-style-type: none"> Increase <u>incentives</u> for PhD and postdoc research Increase <u>exchange, internship and scholarship</u> opportunities for students, researchers & faculty 	△ With only a few agencies providing programs, Japan constitutes only 0.25% of Indian outbound students	✓		✓
Collaboration	Utilize Bilateral MoUs effectively through Eols and RfPs	<ul style="list-style-type: none"> Float <u>Eols and RFPs</u> on particular themes and interested institutes, faculty, scholars could submit proposals 	△ Eol/RfP though DST/DBT are few in numbers and not continuous		✓	✓
	Constitute a centralized Agency	<ul style="list-style-type: none"> Establish <u>multilateral forums</u> to catalyse long-term scientific collaboration <u>Single PoC</u> for industry & academia at host institute 	△ R&D Forums are less compared to West; Japan desks are few due to long time and effort commitment			✓

Budget of different collaboration models depends on the scale, frequency and domain of collaboration

Type	Description	Budget / Finances	Stakeholders		
			Academia	Industry	Govt.
Consortiums aimed towards specific issue/sector	Conduct <u>symposiums, seminars and networking events</u> focused on a domain	Depends on the scale of the consortium, frequency of events, etc.	✓	✓	✓
Scholarships	Provides <u>opportunities and financial support</u> for study abroad programs	Stipend of 1K~1.2K USD/m ¹	✓		
Internship Program	Provides <u>work/R&D experience for students</u> by Companies/Universities for a short duration of upto 3 months	Recruiter provides for student's stipend (inclusive of living & travel expenses)	✓	✓	
Joint Courses / Workshops	Faculty share <u>insights / learning on a predefined topic</u> to fellow faculty or students	Depends on duration of joint course/workshops	✓		
Faculty Exchange Program	<u>Faculty operates abroad</u> at one of their university's partner institutions	Host country bears faculty's living expenses	✓		
Student Exchange Program	<u>Students study abroad</u> at one of their university's partner institutions	Host country bears student's living expenses	✓		
Joint Degrees	<u>Joint degree</u> are awarded collectively by 2 or more institutes	Depends on the structure of the joint degree	✓		
Consultancy Project	Individual faculty or faculty group <u>contributes towards Industry R&D</u> with defined deliverable & timeline	95.64k USD on average ²	✓	✓	
Chair Professorship	Includes person appointed as a Professor of the University excluding Emeritus/Honorary/Visiting/Adjunct Profs.	The professor is paid within the professorial salary range (2K - 3K USD ³)	✓		

Budget of different collaboration models depends on the scale, frequency and domain of collaboration

Bilateral/Multilateral







Type	Description	Budget / Finances	Stakeholders		
			Academia	Industry	Govt.
Call for Proposals	They are a method of calling a proposal <u>for carrying out a project</u> from researchers	Depends on the aim, scale and impact of the call	✓		✓
Seed Fund	Institutes <u>allocate seed fund to develop plans for long-term programs</u> integrating academics, students and researchers from participating universities	Depends on purpose of the seed fund (10k-30k USD ¹)	✓	✓	✓
Collaborative R&D Projects	Funds for required <u>research expenses and equipments</u>	77.08k USD on average ²	✓	✓	✓
Research Labs	Allows basic and <u>applied research work</u> by the participating institutes	Depends on the scale of the lab and its domain of work	✓	✓	✓

Source: Interaction with IITs

¹IITK Seed Fund Data; ²Average calculated based on IIT Delhi data for 2017-2021

Joint R&D: Key Focus Areas

AI, IoT, electronics, semiconductors, new energy are few interesting areas for joint R&D. These are also supported by Government of India programs

#	Theme	Description	Government of India Programs
1	 AI, IoT and ICT	Japanese companies <u>lack expertise in the software industry</u> and can <u>source one of the best talents in the world</u> in the field from India	Digital India
2	 Electronics and Semiconductors	Electronics and semiconductors are some of the <u>top strengths of Japan</u> and the industry is <u>expected to grow massively in India</u> in the near future	Make in India, Production Linked Incentive Scheme
3	 Transportation and Supply-Chain	Japanese expertise could be used in the upcoming booming sector in India to <u>increase efficiency and achieve cost reduction</u>	Smart City Mission
4	 New Energy	Various <u>bio and alternate fuel research</u> is conducted at IIT Guwahati and there is also a bio-refinery for bio-fuel in Assam	National Action Plan on Climate Change, Hydrogen Energy Mission
5	 Collaborative Robotics (Cobotics)	IIT Delhi has set up a <u>Technology Innovation Hub for Cobotics</u> and Japanese Academia and Industry could collaborate for the same	Start-up India
6	 Smart Agriculture and Fishery	Japan's advanced agriculture practices can open <u>immense growth opportunities to the large but technologically weak Indian agriculture sector</u>	Indian Council of Agricultural Research

Enhancing Indo-Japan Start-up Support: Collaboration Models

Accelerator programs, ecosystem support, funding, market/technology sharing, mentorship & joint product development are common collaboration models

Benefits	Details
 Funding Start-ups	Encouraged funding support from Japanese conglomerates, tech giants, banks, PE and VC firms to fuel and take part ownership in the growing start-up ecosystem in India
 Joint Product Development	Benefit from the low cost of development and manufacturing in India by providing the Japanese best-in-class technical know-how for developing hardware-based products
 Mentorship	Mentorship and guidance by industry veterans to the booming number of young Indian entrepreneurs
 Market/Technology Exchange	Opportunities to access the huge Indian market by sharing the latest technologies and manufacturing systems & processes
 Industry Collaboration Platform	Platforms where start-ups and industries from both nations can add collaboration opportunities (projects & requirements), increasing awareness and promoting collaboration

Incubation centres are largely flexible and open to different models, and collaboration can be worked out basis stakeholders' preferences and priorities

Joint R&D: Existing Japan Collaborators - Academia and Industry

Many top academic institutions, industries, and public agencies are already collaborating with Indian institutes

Academia Partners



Industry Partners



Public Agencies and Other Organisations



Source: IIT Council, Institute websites

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