

# Innovation and Entrepreneurship Ecosystem at IIT Kanpur: A Journey of Serendipity

2

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## Abstract

The journey of an entrepreneurial firm towards success is fraught with landmines of failure interspersed with serendipitous opportunities. Building and sustaining an ecosystem to nurture these efforts to fruition, particularly in an academic setting, is not only humungous, but also faced with insurmountable challenges at every turn. There is no pre-defined path or an established formula in achieving this objective. Each ecosystem has to traverse its own path constantly learning from its own experiences and evolve into a viable and sustainable ecosystem. This article traces this journey at IIT Kanpur over the past one decade providing rare glimpses into the domain of building and sustaining an innovation and entrepreneurship ecosystem anchored to an academic institute or a technical institute of higher learning within the framework of a national innovation ecosystem.

## Keywords

Academic institution • Innovation ecosystem • Entrepreneurship • Technology incubator

## 2.1 Introduction

The seed of the innovation ecosystem at Indian Institute of Technology Kanpur was sown in late 1990s with the active support and engagement of Small Industries Development Bank of India (SIDBI) as a natural extension to its existing efforts of being the banker for small and medium enterprises of India. This seed was further nurtured by the Department of Science and Technology (DST), which was assigned the

mandate of creating entrepreneurial ecosystems at the national level in collaboration with institutions of learning. DST over the last decade and a half has been able to nurture more than 100 such islands of vibrant entrepreneurial hubs in academic settings across the length and breadth of the country. This effort by DST has been further augmented by government departments, such as Department of Electronics and Information Technology (DEITY), Department of Biotechnology (DBT), Ministry of Small and Medium Enterprises (MSME), Ministry of Labour and Employment (MoLE; now called as the Ministry of Skill Development and Entrepreneurship) and Department of Scientific and Industrial Research (DSIR), to name a few.

These efforts have led to the founding of over 20,000 start-ups and growing, valued at \$75 Billion directly employing over 300,000 people. A recent report by NASSCOM puts India in the third place globally, having 4200 new age companies and growing at the rate of three to four start-ups per day with funds in this sector having reached a \$5 Billion (Rs. 325 Billion @ 65/\$) mark in 2015.

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## 2.2 The Genesis

It was a chance visit to Israel in 1993 by Prof. Sanjay G. Dhande, the then Dean of Research and Development, who observed there that each academic institute had an internal entrepreneurial ecosystem channelizing the students creative and innovative ideas into business propositions and enabling them to monetise the same. This idea to offer students an alternative career option of being job creators instead of job seekers, triggered the imagination of Dr. Dhande who believed that it was time for the highly subsidized elite institutions like IITs to nurture job creators instead of job seekers, thus enabling these institutions to contribute to the economy by leveraging their intellectual wealth.

A chance call from SIDBI, Lucknow, inviting a proposal to be submitted at a short notice, for setting up an innovation centre at the institute led to the founding of what is called today as the SIDBI Innovation and Incubation Centre (SIIC) in the year 2001. The centre eventually started its operation in 2004. This article would be incomplete without acknowledging the contribution of Prof. Sanjay G. Dhande and Prof. Ashok Mittal for their efforts in making this possible, and Dr. Rahul Varman's role as the first coordinator to operationalize the same. Dr. Dhande, who went on to become the Director of the institute and held the position for 10 years, was a pillar of strength and support; not to mention Prof. Ashok Mittal's contribution in nurturing this ecosystem, transforming the single incubation centre having a 10,000 sq. ft. footprint into a vibrant innovation ecosystem having a 100,000 sq. ft. footprint (and still growing!).

SIIC was the first small step towards transforming IIT Kanpur into an innovation hub. It was way ahead of its time, as the external ecosystem was not ready and finding entrepreneurially minded people to take advantage of the system were few and far in between. Fostering innovation, research and entrepreneurial activities in technology-related areas, it is primarily focussed on:

- Creating a generation of zealous entrepreneurs.
- Converting novel research into valuable intellectual property.

Since the beginning, the centre was made accessible to everyone. In this, we believe SIIC is the only incubation centre anchored to an academic institution which opens its doors to any entrepreneur from anywhere in the world without any reservations. Any limited liability company promoted by any individual desiring to nurture their idea could contact the centre, seeking mentorship and incubation. However, generating trust amongst start-ups and convincing IITK students and faculty to come forward and turn their innovative ideas into profitable ventures turned out to be a humongous task. The fully air-conditioned incubator capable

of housing 16 ventures at that time laid vacant for almost a couple of years before entrepreneurial ventures started trickling in. (Today, SIIC boasts of over 30 incubates thriving in the ecosystem.)

## 2.3 The Learning Curve

As SIIC offered its services to entrepreneurial ventures registered with it, it realized that it still needed to learn the ropes of the trade before gaining a strong foothold as a technology incubator. A major learning was that, for successful incubation, the incubator has to leverage the strengths of its host institution, which, in this case, is IIT Kanpur. Given that IITK has state of the art laboratories and experimental spaces which are augmented by a large pool of captive intellectual resources such as students, faculty and researchers, opening these resources to be tapped by an entrepreneurial firm would not only decrease the cost of taking the idea to market, both in terms of time and financial resources, but also improve the probability of success of an entrepreneurial venture.

Given the above, SIIC has expanded its services to incubate companies by providing:

1. **Access to IITK Infrastructure:** Till 2001, IITK laboratories were accessible only to faculty and students. To make them available to start-ups as well needed a proper policy framework. The most difficult task was to convince incubate companies to nominate 3% of their company's shares in favour of IIT Kanpur and 1% in favour of the mentor. It was made compulsory for the start-ups to select one faculty member from the institute who shall act as a mentor and guide the company on product development in return of 1% of share equity. However, they can also opt for an industry mentor over a faculty mentor from the SIIC database. After countless meetings and heated debates, the policy framework was put in place. Today, SIIC charges the incubate companies for infrastructure and services, seed loan and IIT Kanpur Intellectual Property in form of service charges and equity share.
2. **Unmatched Facilities and Services:** Besides offering a fully furnished air-conditioned incubation space with all the necessary amenities, SIIC also offers a common pool of soft and hard infrastructure to be shared by all incubate companies. *Moreover, SIIC is the only incubator in the country which provides on-campus furnished residential accommodation to the promoters of incubate companies.* The support services given to the start-ups include mentoring and advisory services as well. In addition to the IITK's expert faculty, specialized mentors are also made available to the companies to either assist with

particular strategic areas or to provide project-oriented consultation.

3. **Numerous Funding Options:** Over a period of time, several funding options have been made available to the incubated companies. Primary funding options include PRISM (Promoting Innovations in Individuals, Start-ups and MSMEs), MSME (Ministry of Micro, Small and Medium Enterprises) and DIT (Department of Information and Technology) support. SIIC further assists the incubated companies in availing more funds from banks such as SIDBI Risk Capital/Venture fund, government funding such as TDB, BIRAC, SIDBI-TIFAC, Strategic Stake from Industry and others. The centre also facilitates funding from venture capitalists and angel investors.

From the recovery of the seed fund and earnings through equity dilution, SIIC has now started its own modest seed fund for disbursement. It has undertaken seed fund disbursement (in the form of soft loan and/or equity option) to more than 20 start-ups through external available funding and facilitated risk capital and venture funding (Stage II and III) to over 10 start-ups amounting to about Rs. 100 crores. IIT Kanpur's equity in top 10 start-ups is valued to be more than Rs. 15 crores.

## 2.4 Nurturing the Environment

As the centre started progressing gradually, both as an incubator and a technology transfer office, it was envisaged that for it to grow and expand into an ecosystem, a set of activities would have to be undertaken in parallel creating a pipeline of future entrepreneurs.

### 2.4.1 Developing R&D Infrastructure

Though the IITK laboratories were made accessible to the incubate companies, a need was forecasted to have independent laboratory infrastructure where innovators could experiment with their ideas and develop them into prototypes. Not only this, but the lament of academicians that the students spend their time more on social media and other undesirable pursuits could be effectively addressed by creating a tinkering space with state-of-the-art facilities open round the clock to encourage and harness the creative energies of these future technocrats and igniting the dormant spirit of entrepreneurship. This led to the setting up of first of its kind laboratory called Tinkering Laboratories in India funded by DST and augmented by alumni contributions. This model of Tinkering laboratories as a creative space has been adopted by the DST and floated across the country vindicating SIIC's foresightedness in this regard.

Extensive infrastructure spread over 10,000 m<sup>2</sup> has now been developed over the years to provide an in-house state-of-the-art support system to all incubates and students, thus meeting their software as well as hardware manufacturing needs within the campus (Fig. 2.1). The incubates and students can avail (a) design and development software, operating systems platforms, computational tools, data storage, etc. and (b) hardware manufacturing needs such as prototype development, precision machining, fabrication, electronics and printed circuit board development, micro/precise fabrication and welding under one umbrella called as the **Imagineering Laboratory** (Fig. 2.2). This laboratory has three major components (a) Tinkering laboratory (b) 4i laboratory and (c) Motwani ideation accelerator.

*Tinkering Laboratory:* Started in late 2012, the Tinkering laboratory works in conjunction with the 4i laboratory. It is a platform for creative minds to come out of their 'Think Space' to hands-on 'Tinker Space' in order to transform their ideas into real-time engineering objects and eventually to products and patents. The laboratory is accessible to incubators from all across the country as well as to students and start-up entrepreneurs to test, validate and prototype their ideas into new products and services, specifically in the areas of mechanical/electrical/electronic elements fabrication processes. Tinkering laboratory witnesses at least 18–20 foot-falls per day with students from different departments and programs. The facilities available at the Tinkering laboratory include basic lathe and milling machines, 3-D scanner, bench drilling machines, vacuum plastic forming machine, injection moulding machine, sheet metal cutting and bending machine, shearing machine, small grinders, buffing tools, hand grinders and drill machines, metal fitting and wood work activities, spray painting, fitting and carpentry tools, marking and measurement tools, welding machine and air-compressors.

*4i Laboratory:* The 4i Laboratory, inceptioned in the year 2003, is aimed at providing high-end manufacturing support to UG and PG activities across the institute and also to help incubate new companies at IIT Kanpur. The laboratory houses machining centres which are mainly classified as CNC centres, non-traditional machining centres, PCB fabrication line and associated equipment, conventional machining centres, etc. All high-end and precision manufacturing jobs are handled by this laboratory.

*Motwani Ideation Accelerator:* Established with the generous funding by Motwani Foundation, Motwani Ideation Accelerator (MIA) is a soft facility in the domain of embedded systems, platforms, algorithms and IT related ideas. The sole purpose of MIA is to facilitate and nurture groundbreaking and innovative ideas primarily sourced from B.Tech. and M.Tech. projects, and Ph.D. dissertations. It is also in the process of linking up with other prominent accelerators in India, such as Indian Angel Network





Fig. 2.1 A snapshot of various facilities under SIIC



Fig. 2.2 A collage of activities and infrastructure of the Imagineering Laboratory

Incubator, Microsoft Accelerator, Khosla Laboratories, The Hatch, Villgro, and The Startup Village so that students not only gain wider exposure, but also refine their ideas through summer and winter internships at these accelerators. SIIC is in the process of creating two venture funds as a part of this accelerator:

1. *Rajeev Motwani Impact Fund*—It is meant to support groundbreaking ideas specifically that target to benefit the bottom half of the economic pyramid, for e.g. start-ups dealing with poverty alleviation, non-formal learning/education/technology for the poor, mobile health support.
2. *Rajeev Motwani Venture Fund*—It is meant to encourage ideas emerging from Indian academia to help the creation of the next generation mobile internet and health technologies.

*Bio-Incubator*: Established by BIRAC, under BISS (Bio-Incubator Support Scheme) in 2016, Bio-Incubator is a boon to biotechnology based start-ups as it is situated in one of the India's most prestigious institutions—IIT Kanpur. The expertise and existing resources available at IIT Kanpur enables it to stand out amongst other bio-incubators. As an integral part of innovation ecosystem of IITK, bio-incubator is emerging into other related domains of sciences and is in the process of developing an in-house research park. Besides addressing the needs of bio-innovation and promoting entrepreneurship, bio-incubator at SIIC is adopting advance technologies and working rigorously to remain at the forefront of global health and business world. So far, it has incubated more than 13 companies and successfully graduated 3 of them. The incubator also helps incubate companies to stay abreast with the latest research and upcoming technologies.

*MoLE Incubator*: This Incubator has been set up to attract the grassroot innovators, typically with Diploma/ITI background, from the technical Institutes in the region working in the area of Power Generation, Distribution, Transmission, Wiring and Electrical Equipment. Apart from technical skill upgradation in electrical and relevant mechanical engineering aspects, all participating candidates will be provided training in entrepreneurship, legal and accounting procedures, IP management, business development and marketing. SIIC has partnered with Regional Advanced Training Institutes and the World Bank for operationalizing the incubator.

*Incubation Accelerator*: The centre is creating an accelerator in the NCR (National Capital Region) region at Sector 62, NOIDA, to facilitate business development and funding. In addition, a small office facility for accelerator services is planned at the Wall Street, New York, USA.

## 2.4.2 Promoting Entrepreneurship at Student Level

The most crucial step towards creating a vibrant entrepreneurship ecosystem at the institute was to engage the student community. Towards this end, SIIC together with the student community started an international business competition called Megabucks in 2000, which slowly over a period of 9 years evolved into an Entrepreneurship Cell (E Cell). E-cell is a student senate approved body that organizes several events around the year such as E-Summit, TEDx, E-Factor, Techkriti, business competitions, workshops and seminars, boot camps, and 'unconventions' to provide a platform wherein students are gradually introduced to various facets of entrepreneurship. Besides E-cell, the centre is actively engaged in the functioning of the following:

*Business Club*—The Business Club aims to inform, inspire and encourage students about business and entrepreneurship. The club enhances one's acquaintance with the business world with the help of Focus groups: Strategy group, FINIIT group (finance enthusiasts of IIT Kanpur) and the Newsletter, and by holding regular lectures, workshops, competitions and strategic games, which unveil the real market situations to the students.

*Promotion of Work Experience and Research (PoWER)*—It is a student body aimed at promoting and coordinating student research and development through industry-academia interaction. It aims to provide students the freedom and opportunities to work upon diverse areas of business, technology and existing industrial and national challenges, as well as pursue their own ideas so as to become innovators and future leaders. It is a step towards creating a sustainable innovation ecosystem.

SIIC has also conceived and proposes to implement a series of activities to engage, ignite and sustain the entrepreneurial spirit of the students:

- Graduate Entrepreneur Fellowship Program (GEF), where a student, if he or she chooses to embark on the entrepreneurial path immediately after graduation, will be awarded a fellowship during the period of their incubation in lieu of equity.
- Introductory 101 course on Entrepreneurship and Innovation.
- Introduction of Master's program in Entrepreneurship and Innovation.
- SPADE (Systematic Promotion and Development of Entrepreneurship) Program: Under this program, several proactive initiatives for interaction between the stakeholders are planned to be executed by dedicated resource persons, as part of the annual calendar of the institute.

### 2.4.3 Initiating Outreach Programmes

From the very beginning, SIIC's vision was to contribute towards creating a healthy ecosystem for innovation in the country and therefore it entered into strategic alliances with organizations such as NEN (National Entrepreneur Network), IIM Ahmedabad and others. Together with these, the centre organized regular workshops and trainings in institutes across the country to promote entrepreneurship. In addition, it regularly conducted awareness programs, talks, group discussions, seminars and outreach activities, in association with organizations such as TiE-UP, FICCI, ISBA, SIDBI, MSME and other supporting groups.

The Syndicate Bank Entrepreneurship Research and Training Centre (SBERTC) at the institute is another centre which conducts cutting-edge research, teaching and training in entrepreneurship in the Indian context by utilizing the facilities of SIIC and the existing intellectual pool in the institute.

## 2.5 Evolution of Innovation and Entrepreneurship Ecosystem

Today, the ecosystem at IIT Kanpur is a unique experimental and incubation space fostering innovation and entrepreneurship. SIIC is not a stand-alone facility contributing to the innovation and entrepreneurship ecosystem at IIT Kanpur, but only one component of it. The ecosystem is driven by a set of laboratories and testing facilities encompassing the entire gamut of engineering disciplines from Bioengineering, Mechanical, Electronics and Electrical to IT and ITES, and is open to anyone with an innovative idea. These facilities provide the students, innovators and entrepreneurs, both within the institute and outside, a unique environment to fructify their ideas into viable high technology intensive products, thus helping them in building a successful entrepreneurial venture. SIIC, along with the Innovation Council guiding its operations, is at the epicentre of this ecosystem fostering, facilitating and funding these nascent entrepreneurial ventures. IIT Kanpur faculty plays an important role in this ecosystem by providing knowledge and technical expertise as mentors to make them globally competitive.

### 2.5.1 Incubation Centres

From 2000 till date, SIIC has grown from one incubation centre representing IIT Kanpur to nine centres representing various arms of Government (Fig. 2.3). It acts as a

- SIDBI Innovation and Incubation Centre (for SIDBI)
- Technology Business Incubator (for DST)
- MSME Incubator (for MSME)
- Technology Incubation and Development of Entrepreneurs (for MIT)
- Technology Entrepreneurship Promotion (for DSIR)
- Bio-Incubator (for DBT)
- MoLE Incubator
- Social Enterprise Incubator (Newest addition).

The activities at these centres have been supported by initial corpus funds supported by IIT Kanpur, Government of Uttar Pradesh and Small Industries Development Bank of India (SIDBI). Subsequently, funds have been received for supporting seed funding and operational expenditures from Technology Business Incubator (supported by NSTEDB), Department of Information Technology (DIT), DBT, Incubation activities under the Ministry of Small and Medium Enterprises (MSME), Incubation activities under Department of Scientific and Industrial Research (DSIR), Incubation activities in power generation, distribution and transmission (supported by Ministry of Labour and Employment, now termed as Ministry of Skill Development and Entrepreneurship), and Social Entrepreneurship INVENT Program of the Department of International Development (Government of UK).

### 2.5.2 Portfolio

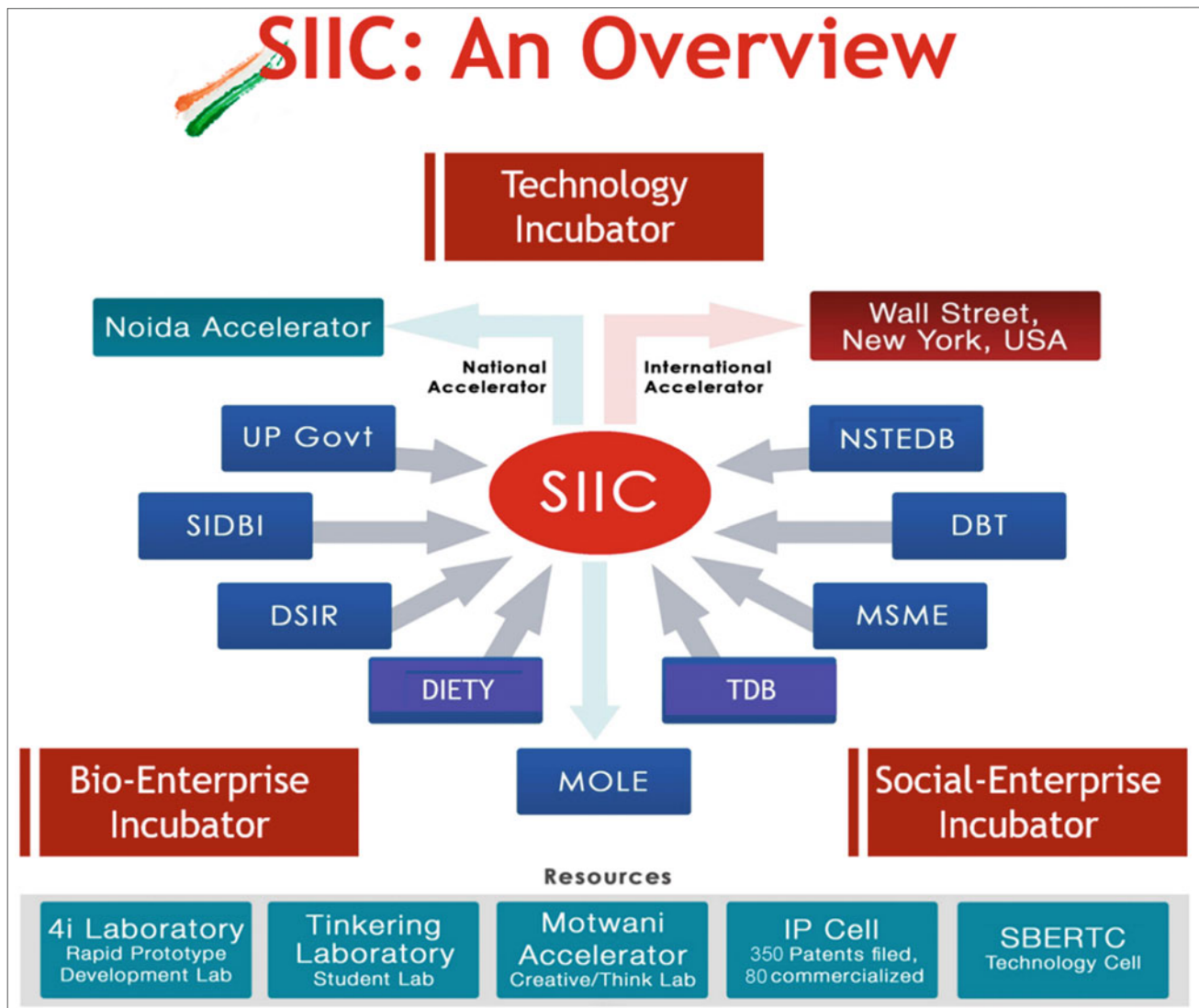
So far, the centre has mentored over 60 start-ups; out of which 35 companies have already graduated and 30 are still under incubation (Fig. 2.4). There have been four exits from the incubator, wherein equity dilution of IIT Kanpur's share has been achieved with dividends. Several acquisitions have also been achieved, some of which are tabulated in Table 2.1. Many of the start-ups are scaling fast on the success ladder. For more details on the present portfolio, please visit [www.iitk.ac.in/siic](http://www.iitk.ac.in/siic).

Any private limited company desiring to nurture their idea can contact the centre seeking mentorship and incubation. However, the selection procedure is vigorous where an applicant is scrutinized on the technical and business feasibility of the idea.

### 2.5.3 IP and Technology Transfer

Since the beginning, SIIC has acted as a nodal agency for IP and Technology Transfer for the institute. It provides professional aid to the IITK faculty and students for filing





**Fig. 2.3** Structure of SIDBI Innovation and Incubation Center, IIT Kanpur

patents and copyrights. Besides, the centre facilitates the use of IITK IP if desired by a start-up. The terms and conditions for such IP licensing are decided by the institute. So far, over 350 patents have been filed, out of which about 50 patents, worth over Rs. 3.0 crores, have already been successfully commercialized (Fig. 2.5).

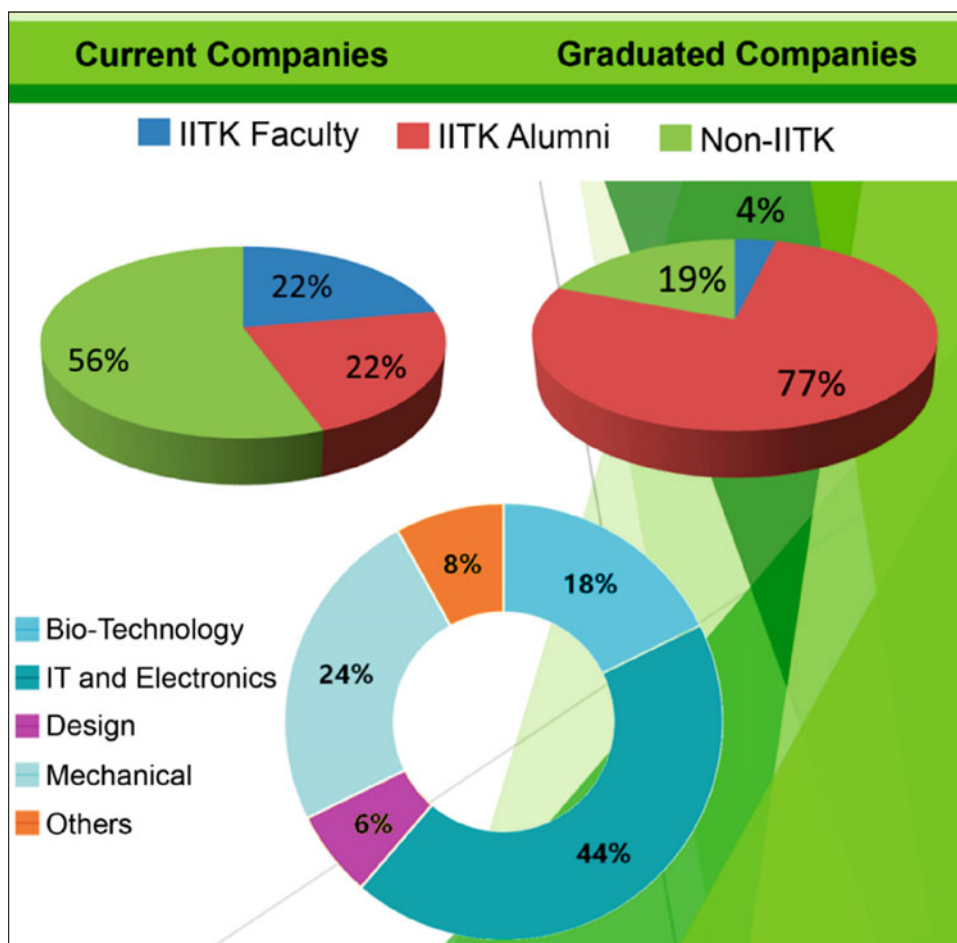
SIIC also facilitates the modification and upgradation of the software/products developed by the faculty/students of IIT Kanpur to suit the industry requirements with the help of a commercial partner. The concerned faculty member acts as a mentor. The commercial partner is also responsible for marketing the product and providing customer support.

## 2.6 The Way Ahead

Since its inception, the centre has grown tremendously and has emerged as a prestigious incubator in India. It won the National Award for Technology Business Incubators for the year 2011. The centre continues to grow, and the future looks bright. In the immediate future, SIIC is undertaking two major initiatives for which funds have already been generated:

**Establishment of an Industrial and Translational Research Park.** IIT Kanpur has been performing high-end research since its inception. The sponsored research funding

**Fig. 2.4** Statistical overview of SIIC, IITK portfolio



**Table 2.1** Mergers and Acquisitions

Incubate company	Strategic stake/merger
Adya Systems	Whiz Net Inc., USA
Aurora Integrated Systems	Tata Group
Whorl Engineering	Walchandnagar Industries
Weather Risk	ICICI Lombard
Aarsh Management	CMC Ltd.
Geokno India	GMR Infrastructure
Irene Nanocore	Biocon

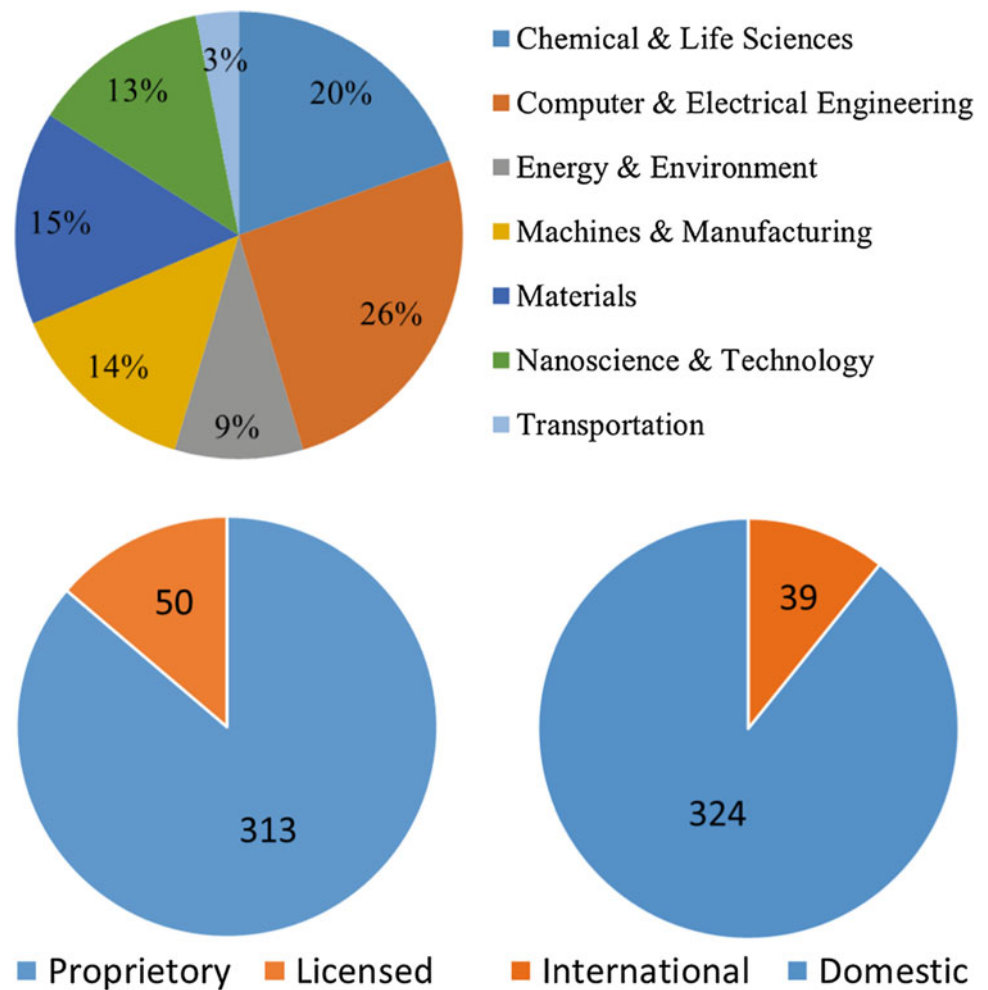
and research output of the institute has grown significantly over the years, and the success in various disciplines has given it national and international visibility. Simultaneously, the innovation and entrepreneurship ecosystem of the institute has seen tremendous growth. The current level of engagement with the industry makes evident the rich ecosystem at IIT Kanpur. The nature of the interactions with the industry has helped in identifying the contributing units of the ecosystem. However, the scale of these interactions needs to be enhanced. This will also facilitate the goals of discovery, knowledge creation, commercially viable patents, spin-off ventures, leading to much needed innovation and

entrepreneurship development. This requires new investments for improving the research and development infrastructure on the campus. Perhaps, the most important step required in this direction is the setting-up of a state-of-the-art Industrial and Translational Research Complex. The vision of the proposed complex is to provide easy access to infrastructure, equipment and technical knowledge base to the industry and academia to create a sustainable and affordable industrial research ecosystem in the institute.

Industrial and Translational Research Complex has been conceived as a new kind of research and development space within IIT Kanpur. It will be primarily used for housing



**Fig. 2.5** Patents statistics of the institute



industry-sponsored laboratories and incubating technology-oriented companies. The institute will evolve suitable policies, in consultation with the Institute R&D Committee, to allocate and manage space in the Innovation Research Complex for industries research units and their projects thereof. Some part of the Research Complex will be used for housing central research facilities, which can be used by any researcher across the institute. The complex will stimulate innovative research in cross-disciplinary areas that hold promise for significant development in the years ahead. The complex will encourage faculty, students and entrepreneurs/industrial units from diverse disciplines to interact in a mutually supportive manner. This concept of an integrated complex is probably being tried for the first time in an academic institution in India and could become a trailblazer.

**Establishment of a Social Incubator.** The Technology Development Board (TDB), Government of India in partnership with the Department for International Development (DFID), UK, have initiated the 'Innovative Ventures and Technologies for Development (INVENT)' program. TDB,

being the anchor of the program, has chosen Villgro, India's oldest and foremost social enterprise incubator, to execute this program. This program aims to support up to 400 entrepreneurs in the 8 low-income states (UP, MP, Bihar, Chhattisgarh, Jharkhand, Rajasthan, Orissa and West Bengal) and make at least 50 of them investable in the next 5 years. Based on its 15 years of experience in incubating social enterprise, Villgro has decided to support 4 other incubators, and SIIC, IIT Kanpur, is one of them. The INVENT program, to be launched in the summer of 2016, will provide selected incubators with technical and financial assistance by way of mentoring, networks, know-how, templates, etc., to make selected incubators successful at social enterprise incubation. The ultimate goal is to create a viable social enterprise (for-profit) pipeline for impact investments in the above mentioned low-income states (LIS) of India. SIIC is looking forward to participating in this exciting program and bring IIT Kanpur to the forefront of social and impact incubation in the country. If more investments are made available to test new ideas generated by India's entrepreneurs, India would be well placed to

develop solutions to entrenched global development challenges, of relevance not only to India, but also to low-income countries.

## 2.7 Summary and Outlook

India is a country of incredible contrasts—post independent India has come a long way from a ‘developing, third-world, poor nation’ to a vibrant middle-income, emerging market economy-driven democracy with an enviable young workforce. While business and entrepreneurship skills resides in our psyche from time immemorial, its union with modern science and technology is what will catalyze a paradigm shift in the existing levels of poverty. High-quality technical education on the one hand and development of technology-based entrepreneurship skills on the other working in unison is the only potent solution for improving the quality of life and generating employment in the country. Technology incubators certainly have a definitive role to play in the emerging scenarios.

In this background, IIT Kanpur has created a unique ecosystem for nurturing innovation and entrepreneurship within the academic campus, singular in many aspects in the entire country. While SIIC has managed to achieve several benchmarks, there are many challenging aspirations not only

from the student and entrepreneurship community in particular, but also from the nation as a whole. In this exciting journey, SIIC is committed to help create and manage intellectual property for the institute, set up an exemplary paradigm for technology incubation and to catalyze entrepreneurship for positive socio-economic impact. The centre strives to provide even robust platforms in the near future for start-ups and prospective entrepreneurs, including IITK students, faculty and those in the society at large, for converting their innovative ideas into commercially viable products and services.

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