



Centre for Research on Start-ups and Risk Financing

Indian Institute of Technology Madras

Activity Report

2021 - 2024





“

The Information Platform developed by CREST is a very unique platform today because this is a one stop shop for all information on start-ups...one is able to access information like never before. Instead of going through hundreds of different websites this is one platform where young entrepreneurs and start-ups would be able to access all information – where they can get support from different areas and how they can become great entrepreneurs. This is a national service at its best and this platform will be a national asset for everyone particularly the young entrepreneurs who want to their own start-ups.



SHRI. AMITABH KANT

G-20 Sherpa, at the launch of the Government Funding Product,
October 25, 2023

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The background of the entire page is a repeating pattern of stylized deer. Each deer is depicted in a simple, line-art style with a light grey outline and a darker grey patch on its back. They are arranged in a grid-like pattern, facing various directions.

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PART A

Overview

“

Vision is the art of seeing what is invisible to others.

JONATHAN SWIFT

The Vision and Objective of CREST



Destiny is not a matter of chance, but of choice.
Not something to wish for, but to attain.

WILLIAM JENNINGS BRYAN

Vision and Objective

A confluence of factors has resulted in India becoming an epicenter for start-ups and innovation. Start-ups and SMEs are expected to contribute about 50 percent to the country's near-term GDP target of \$5 trillion as well as the long term target of \$30 trillion. Policy makers therefore want to nurture and support the growth of start-ups to meet the overall economic goals. On the other hand, entrepreneurs find the current business environment favourable for starting-up, resulting in a dramatic increase in the number of start-ups.

Since January 2016, when the start-up scheme was rolled out, more than 137,000 companies and partnership firms have registered themselves as start-ups.^[1] If we include the unregistered start-ups, the number crosses 208,000.^[2] Investors^[3] on the other hand, find Indian start-ups to be attractive investment opportunities. A look at the investment in Indian ventures helps to put things in perspective. The investment in start-ups have been more than ₹21 trillion (or about ₹21 lakh crore), with equity contributing about 65 percent of the above, and the remaining from debt.^[4]

The Indian start-up ecosystem today is therefore very vibrant. Formulation of start-up policies, setting up of incubation centres, growth in investments, and focus on entrepreneurship in academic curricula, have led to an increase in the number of start-ups. However, growth of ventures and entrepreneurship in India so far has been predominantly led by policy and practice.

For a segment that has attracted so much investment and policy interest, research activity has not been commensurate. Academic research and thought leadership can play an important role in furthering the growth and improving efficiencies by understanding what works and what does not, and why.

Research insights can make policy decision making can become more evidence based, while managerial and investment decision making can be more effective. CREST was born from this conviction, with the objective of augmenting policy and practice with academic and thought leadership in innovation, start-ups, entrepreneurship, and risk capital.^[5] The overall vision of CREST is given in Figure 1.

Role of CREST

Top educational institutions have been active in promoting entrepreneurship in their respective campuses. By and large, these initiatives fall under three categories. First, is the setting up of incubation facilities that provide various forms of support in setting up ventures by leveraging the strengths of the host institute. Second, is the setting up of entrepreneurship centres, which focus on programs and training related to entrepreneurship. Third, is the Entrepreneurship Cells run by students that organizes various entrepreneurship related events. Thus, the general theme for start-up support in higher educational institutions has been the dominance of action oriented initiatives that facilitate practice and implementation.

Outside of the educational institutions, it would not be practical for any serious research to happen. That is, though there has been significant traction among policy makers, their nose is always close to the ground^[6] There have been individual researchers who have researched on Indian start-ups and published in top journals. However, such instances have been few and far between. The role of CREST has been to stress the importance of research in the narrative of the growth of the startup ecosystem. The way by which we propose to achieve this is not just by doing hands-on research leading to publications, but by also creating a platform that would help others to easily do top notch research.^[7]

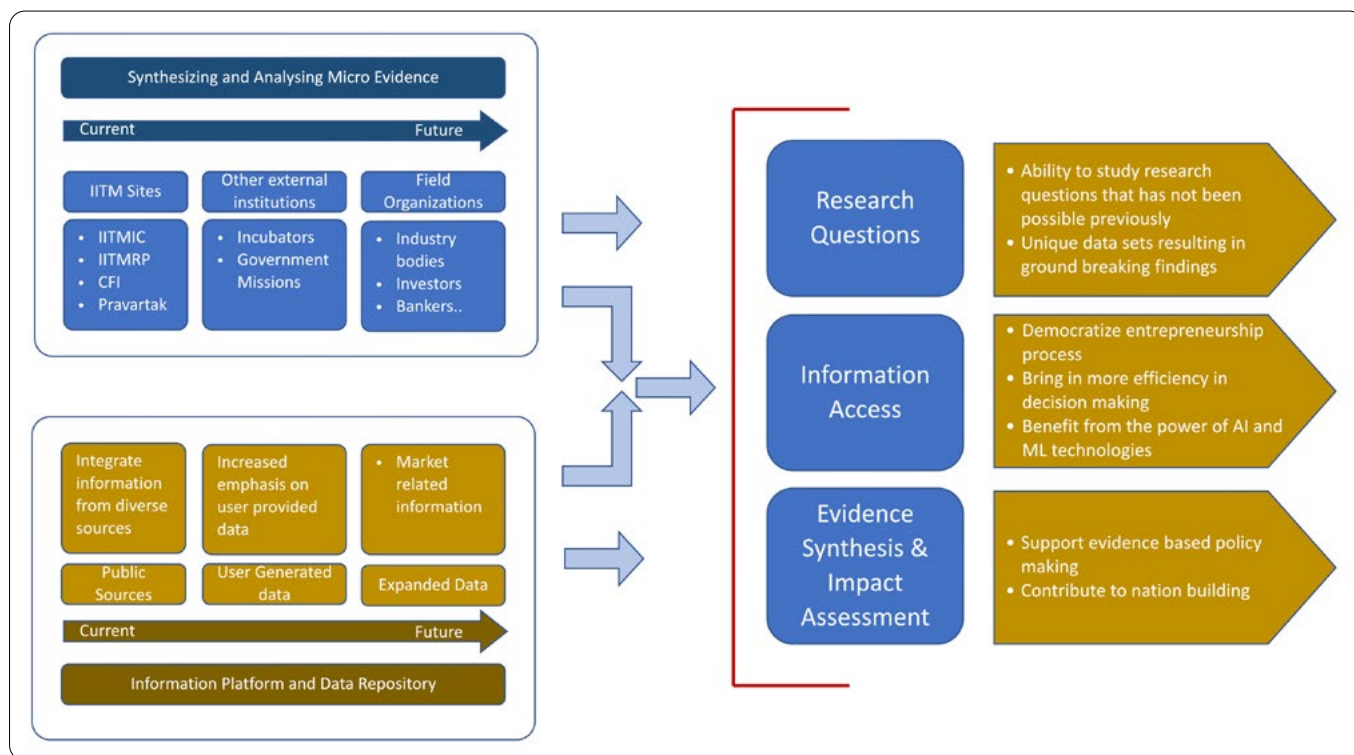


Figure 1: Vision of CREST

The Startup and Investor information platform that CREST has developed is akin to setting up a large experimental facility in science and technology disciplines. While it is the experiments and the results that would get the prominence and publications, all that would not have been possible without the experimental facility. An advanced experimental facility would help to do research that would have not been possible previously. Similarly, the information platform that CREST has developed helps researchers to take up research projects that would not have been possible previously.

Entrepreneurship and Start-ups are significant policy imperatives in the Indian context. It has been a significant area of research, specifically in the US and other advanced economies, for the last 2-3 decades now. Therefore, the problems addressed by CREST would be aligned to the ongoing narratives in the academic and policy environments. Start-ups are expected to account for a significant percentage of economic activity in India and would be a channel for attracting large investment flows. Research findings from CREST would make strong contribution to these areas.

It is hoped that the information platform that CREST has developed would get the attention of top researchers and faculty members from leading global institutes for their research projects. It is also hoped that CREST would catalyse the creation of an interdisciplinary body of knowledge that synthesizes multiple perspectives that would meet the requirements of policy makers, academia and researchers, entrepreneurs, investors, innovators, students, and those interested in innovation and ventures.

Quest for academic leadership

Start-ups and ventures have been prominent research themes globally. To be able to create an impact^[8], CREST must be innovative and bring something new to the conversation. The creation of the information platform is from that perspective. Unlike the sciences and technology, in fields like business and management there are tremendous difficulties in conducting experiments to generate data. Absence of quality data has been a big hurdle for researchers in India to undertake research on topics pertaining to start-ups and venturing.

While there are existing databases on innovation, entrepreneurship and ventures, they are targeted at meeting the requirements of the industry and do not lend themselves well for pursuing cutting edge research. CREST has taken up the responsibility of developing a high quality information platform for the research community. However, the platform has now evolved so much since its conceptualization, that all stakeholders who are engaged with the start-up ecosystem find that the platform caters to their requirements.

Apart from investigating new research topics, large data sets would facilitate adoption of new methodologies and analysis techniques that were not possible previously. For example, use of large data sets would facilitate a more quantitative and technical approach to study risk capital investments in entrepreneurial ventures. It will also help in the use of ML and AI tools and techniques, which will help to discover new causal pathways and linkages.

While the first three years of CREST has been exciting, the possibilities that future holds is immense. More than ever, at this juncture, we seek the support of various stakeholders – government, investors, researchers, start-up founders, enablers, and all other well-wishers through their involvement and contribution to CREST, either financially or through other means.

There is immense potential for CREST to become one of the finest centres of research on start-ups globally, and it would be a real privilege to reach that milestone in the years to come.

Tomorrow holds endless possibilities.

Thillai Rajan A.

Principal Investigator

Centre for Research on Start-ups and Risk Financing

Indian Institute of Technology Madras

^[1] As of May 29, 2024. From <https://www.startupindia.gov.in/>

^[2] From YNOS Venture Engine, www.ynos.in as of May 29, 2024.

^[3] Here we refer to investors in the broadest sense. They could be either domestic or foreign, individual or institutional. Though in the context of start-ups investors are primarily understood to be equity investors, we do not exclude debt in our definition of investors.

^[4] From YNOS Venture Engine Insight, <https://www.ynos.in/products/insight> as of May 29, 2024.

^[5] By risk capital, we refer to Entrepreneurial Financing. In a departure from convention, we wanted to include all sources of financing for entrepreneurship, and not just private equity and venture capital (which are essentially equity funding). The set of funding sources for entrepreneurs would also include, grants, debt, and working capital.

^[6] Research needs a little detachment and taking a step back to look at the big picture. The day to day exigencies faced by those in the field might not make an ideal setting for research.

^[7] Single tree does not make the forest. The impact of research in the start-up ecosystem in India can be felt only if a reasonable number of institutions are able to conduct research. It is our belief that CREST would be able to enable this.

^[8] And also get respect so to speak.

Report on CREST Operations



Once you make a decision,
the universe conspires to make it happen.

RALPH WALDO EMERSON

The formative years of a new organization holds a lot of challenges and excitement. It is these initial years that provide the foundation for a lasting organization that can withstand the test of time. When the Centre for Research on Start-ups and Risk Financing (CREST) started off in 2021, it was a leap of faith for all of us. Now, three years in to the operations and a successful Phase II review, gives us a lot of confidence that we are on the right track.

As we chart our future, it is also a time to look back and reflect. We look back not because we want to go that way, but because we may benefit from hindsight, which is always, oh so perfect. Leading the administration and operations of CREST has been a challenge that I relish every day. It is my pleasure to summarize some of the key activities at CREST during the first three years of its operation, viz., 2021-24.

Visiting CREST

CREST is located in Room 207A, Department of Management Studies at the IIT Madras campus. Being a part of the IIT Madras campus, helps in accessing the infrastructure facilities of the campus and the surrounding greenery presents a very conducive work environment like no other. Visitors are welcome to walk in to CREST during regular office hours to know more about our activities and programs, and also to explore collaboration and partnerships. Prior appointment is advisable to ensure that key members are available at the time of your visit. You can call +91 44 22575559 and inform us of your visit beforehand.

Visitors to the adjacent IIT Madras Research Park can also visit the offices of our partner, YNOS Venture Engine, to know more about CREST and the opportunities it presents. Contact details of YNOS is available at: <https://www.ynos.in/contact>. We also have a comprehensive up-to-date website, <https://doms.iitm.ac.in/crest/> on the different activities going on at CREST. For those who are not able to visit us in person, the website is an equally effective way to know more about the activities of CREST.

Information Platform on Start-ups

A major contribution of CREST has been the development of the Information Platform on the Indian Start-up Ecosystem. Jointly developed in partnership with the IIT Madras incubated start-up, YNOS Venture Engine, the platform has grown to become the most comprehensive information platform on the Indian start-up ecosystem. Part C of this report gives more details about the information platform.

A list of some of the prominent institutions that are using the platform for research, education, and student entrepreneur engagement are as follows:

- Bharathidasan Institute of Management
- IMI Delhi
- Indian Institute of Management Amritsar
- Indian Institute of Management Bangalore
- Indian Institute of Management Kozhikode
- Indian Institute of Management Nagpur
- Indian Institute of Management Tiruchirapalli
- Indian Institute of Management Udaipur
- Indian Institute of Management Visakhapatnam
- Indian Institute of Technology Delhi
- Indian Institute of Technology Indore
- Indian Institute of Technology Madras
- Karunya University
- University of Fraser Valley
- University of Texas at El Paso
- XLRI

International Collaboration

Outbound CREST team visits

- Haritha, a research scholar at CREST, took part in a one-year research program at the University of Technology Sydney (UTS) from April 26, 2023, to May 25, 2024. Her research, titled “Startup Valuation: Analysing the Firm, Industry, and Investor Dynamics,” was part of the joint doctoral initiative funded by UTS and IIT Madras
- Professor Thillai Rajan served as a Visiting Scholar at the Esposito Family Centre for Innovation & Entrepreneurship, University of the Fraser Valley Canada, for a duration of three weeks in June 2023
- Professor P. Krishna Prasanna visited University of Sydney at Australia on a Faculty Exchange Program during May - June 2023
- Madhavan Nampoothiri, a research scholar at CREST, pursued the Joint Doctoral Program (JDP) with the University of Passau during 2021-22. As part of the JDP, he received a Deutscher Akademischer Austauschdienst (DAAD) scholarship. He spent a year at the University of Passau as a full-time research scholar, working under the guidance of Prof. Dr. Oliver Entrop, Chair of Finance and Banking
- Professor Thillai Rajan participated in an exchange program and served as a visiting professor at the School of Business, Economics, and Information Systems at the University of Passau in Germany during the year 2022

Inbound International Faculty visits

- On September 14, 2022, Professor Suresh Cuganesan, Deputy Dean for Students and External Partnerships at the University of Sydney Business School, Australia, graced our center with his presence, marking a significant step towards expanding our network of collaborative endeavors. In addition to formal discussions, CREST orchestrated a tailored interactive session, designed to provide a platform for our research scholars to directly engage with Professor Cuganesan. This session proved invaluable, offering budding scholars a rare opportunity to glean insights from a seasoned academician and explore avenues for potential collaborative ventures
- During December 2023, Professor Krithika Randhawa from the University of Sydney Business School, Australia, visited CREST to foster collaboration. During her visit, the faculty experienced a demonstration of the platform developed by CREST. We are excited to announce that our center is now embarking on a collaborative research project with Professor Randhawa

- During December 2023, Professor Jon Thomas from the University of the Fraser Valley in Canada visited CREST to explore collaboration opportunities. We are also thrilled to announce a joint book project with Professor Thomas, which promises to deliver a comprehensive and insightful publication that will significantly enhance our understanding of the subject matter.

Key Events

- The book, “Shifting Orbits: Decoding the Trajectory of the Indian Start-up Ecosystem” was co-edited by Prof. Thillai Rajan along with colleagues from the partner institutes of iVEIN (Innovation, Venturing, and Entrepreneurship in India Network) published by the Universities Press. The launch event, held on July 23rd, 2021, was graced by Amitabh Kant, CEO of Niti Aayog. The book has been ranked among the top 10 books for entrepreneurs by YourStory: Year in Review 2021 - The top 10 books of 2021 for entrepreneurs.



Year in Review 2021 -
The top 10 books of 2021 for
entrepreneurs.

by YourStory

- Selection of Centre for Research on Start-ups and Risk Financing, as a Research Centre under the Institution of Eminence Research Initiatives. On October 6, 2022, CREST participated in the Phase II Review Meeting and Presentation conducted by the Institute of Eminence (IoE) team from IIT Madras. During the meeting, we outlined the ongoing Phase I activities and anticipated Phase II activities for the project. The IoE team included Prof. Bhaskar Ramamurthi, former Director of IIT Madras, Prof. Raghunathan, Dean of Global Engagement, and external member Bhaskar Bhat, former Managing Director of Titan Industries Limited. Based on the presentation, CREST was selected as an Institute of Eminence - Research Centre, securing funding for the next three years
- CREST hosted the first International Confluence Conference on Startups and Innovation from December 13th to 15th, 2023. The event aimed to encourage active participation and contributions from researchers, policymakers, and practitioners in the fields of startups, innovation, entrepreneurship, and related areas
- IIT Madras hosted its Open House event on March 2nd and 3rd, 2024, showcasing the institution’s cutting-edge research and initiatives over two days. The stall displayed by CREST at the open house attracted significant attention, with many visitors keen to explore its offerings and engage with the CREST team

- On March 9th and 10th 2024, CREST showcased its innovative platform, attracting a diverse array of entrepreneurs and attendees during the E-Summit 2024. The summit themed “Soaring through Shifts,” was the flagship entrepreneurship fest organized by the Entrepreneurship Cell at IIT Madras. The event featured Youth Conclave, Innovator’s Conclave, Startup Conclave, and Startup Essentials, drawing over 18,000 attendees, 50+ speakers, and 60+ mentors. More than 1,000 startups and 30 investors participated, fostering networking and collaboration

As the Indian Startup Economy continues to evolve research centres like CREST becomes more and more relevant. In the first three years of CREST, we have taken baby steps in achieving our objective of understanding the Indian Start-up Ecosystem. As we embark on bigger leaps in the coming years in achieving more progress, we remain cognizant of the following: *Progress: 1 word, 8 letters and infinite possibilities*

R. Shanmugapriya

Chief Operating Officer

Centre for Research on Start-ups and Risk Financing

Indian Institute of Technology Madras





PART B

The Team

“

Alone we can do so little; together we can do so much.

HELEN KELLER

Faculty Team

- Principal Investigator
- Co-Principal Investigators
- Advisory Principal Investigators

“

It's the teacher that makes the difference,
not the classroom.

MICHAEL MORPURGO

Principal Investigator



Thillai Rajan A. is a Professor in the Department of Management Studies, Indian Institute of Technology Madras. He has also been an associate at the Mossavar Rahmani Center for Business and Government, Harvard Kennedy

School, Harvard University. His research interests encompass start-ups, ventures, and SMEs. During 2009 – 18, he edited the annual India Venture Capital and Private Equity Report. In 2020, he played a key role in the formation of innovation, Venturing, and Entrepreneurship in India Network (IVEIN), a multi-institutional consortium to research on innovation and venturing in India. He is also a co-founder of YNOS Venture Engine, a start-up set up to address the pain points of early-stage entrepreneurs.

Co-Principal Investigators



Krishna Prasanna P. is a Professor at IIT Madras. Her research interest includes Stock Market Analysis, Corporate Finance, Corporate governance and Financial Risk Management. She has won Best Paper Awards at the International

conference in Economics and finance – ARC 2013 at Kochi; Athenaeum 2012, at BIM Tiruchirapalli; the International conference on Frontier Global issues in Accounting and Finance organized by Research Development Association, Jaipur, 2012; the International conference on Emerging Financial markets organized by International Center for Finance, PSG Institute of Management, Coimbatore, Dec 2007; and Linkages in term structure of interest rates across sovereign bond markets, 51st Eastern Finance Association Annual Conference, April 2015; New Orleans, U.S.A. She has earned the Doctorate in Finance from the University of Madras and Masters from Osmania University.



Amit R K is a Professor at IIT Madras. Before joining IIT Madras, he was working as an Assistant Professor at IIT Kanpur. His research interest includes Operations Research, Game Theory, Decision Theory and Contract Theory. He had received

the Academic Senate citation for teaching excellence as an instructor for the course “Introduction to Game Theory” taught during Jan-Apr 2010 at IIT Kanpur. He was awarded as one of the three commendable presentations at the Doctoral Symposium held in conjunction with IISc-IBM Research Third Operations Research and Data Analytics Workshop, Bangalore, March 2008. He obtained his B.Tech. and M.Tech. from IIT Kanpur, and doctorate from IISc. Bangalore.



Pinosh Kumar Hajoary is an Assistant Professor of Integrative Management, at the Department of Management Studies at the Indian Institute of Technology Madras. He holds a B.Tech from the Central Institute of Technology Kokrajhar,

an MBA from the University of Hyderabad, a PhD from the Indian Institute of Science Bangalore, and a Postdoc from the University of Stuttgart, Germany. Dr. Hajoary has been the recipient of numerous prestigious awards, including the Indo-German Academic Exchange fellowship, which was funded by DAAD-Germany, as well as the Newton-Bhabha PhD Placement, awarded by both the UK and Indian Governments. His research interests primarily revolve around Industry 4.0, Drones, and other emerging technologies.

Advisory Principal Investigators



Ashok Jhunjhunwala is the President, IITM Research Park & IITM Incubation Cell. He has served as a Principal Advisor to Minister of Power, MNRE and Railways, Government of India, New Delhi. Prof. Jhunjhunwala has been the

Chairman and member of various government committees and has been on boards of several education institutions in the country. He was a Director on the board of State Bank of India, Bharat Electronics Limited, HTL, NRDC, IDRBT, BIRAC, VSNL and BSNL as well as in Tata Communications, Mahindra Electric, Saskaen, Tejas Networks, TTML, Intellect and Exicom. Jhunjhunwala is considered a pioneer in nurturing Industry-Academia interaction in India towards R&D, Innovation and Product Development. He conceived and built India’s first university affiliated business park (IIT Madras Research Park). He has been developing products for masses; affordable yet technically advanced products in India, like Wireless in Local Loop, Remote health monitoring system, ATM, Solar-DC to homes, Affordable electric vehicles, and so on. Government of India has conferred him with the Padma Shri, one of the highest civilian honours.



Krishnan Balasubramanian is currently an Institute Professor at IIT Madras and Chair Professor in the Department of Mechanical Engineering and also serves as the Head of the Centre for Nondestructive Evaluation (CNDE) at

IIT Madras. His research focus is in the field of Nondestructive Evaluation. He has also served as a consultant to many multinational companies including GE, Corning Inc., BF Goodrich, Gillette, Caterpillar, Lockheed-Martin, Nippon TV, Karta Technologies, Sieger Spintech, and so on. He is lead recipient of prestigious DRDO Academy Excellence Award for ‘Outstanding and internationally recognized contribution in the field of NDT in collaboration with DRDO Laboratories.’ For his numerous contributions he was conferred with the prestigious Abdul Kalam Technology Innovation Fellowship and IIT Madras Lifetime Achievement Award in 2018. He obtained his PhD from Drexel University (USA) in 1989. He is currently the Professor in Charge for the Gopalakrishnan Deshpande Centre for Entrepreneurship and Innovation.



Ashwin Mahalingam is a Professor in the Department of Civil Engineering. He received his B.Tech in Civil engineering from IIT-Madras and then proceeded to Stanford University for a Masters in Construction Engineering and

Management. He then helped start up an internet based company in the USA called All Star Fleet, aimed at providing asset management services for construction companies. Following this he returned to Stanford University to pursue a PhD in the area of Infrastructure Project Management. He is the Editor of the Engineering Project Organization Journal (EPOJ) and has served on many national committees. He has been the recipient of the Young Faculty Recognition Award at Indian Institute of Technology, Madras; Best Paper Award, Engineering Project Organizational Journal; and the Distinguished Service Award, Engineering Project Organization Society. Ashwin has been the faculty advisor for the Entrepreneurship Cell at IIT Madras.



Prabhu Rajagopal is a Professor in the Department of Mechanical Engineering and an Associate of the Centre for Nondestructive Evaluation at IIT Madras. Prabhu is passionate about service-oriented engineering education and technology

translation, working closely with companies, agencies and societal bodies in taking these innovations to the field. In this quest he has also co-founded several Startups that license his IPs. His work spans the spectrum of sensing and data management, with the later leveraging latest innovations in AI, ML, AR, VR and Blockchain technologies. Trained at IIT Madras (BTech & DD MTech) and Imperial College London (PhD, Postdoc), Prabhu has expertise in remote structural inspections, with a focus on waveguide ultrasonics and robotics, and management of large scale inspection data sets. Recipient of prestigious Early Career awards from academia and industry (National Design and Research Forum, Indian Society for NDT, Institute for Smart Structures and Systems - IISc & IIT Madras) and India's top award for young scientists (Swarnajayanti Fellowship), Prabhu's work has also been featured widely in popular media.



Thalappil Pradeep is an Institute Chair Professor at IIT Madras. He has conceptualized and built the International Centre for Clean Water. He also held visiting positions at Purdue University, Leiden University (Netherlands), EPFL (Switzerland),

Institute of Chemistry (Taiwan), Pohang University of Science and Technology (South Korea) and the University of Hyogo (Japan). He has been the recipient of various awards like Shanti Swarup Bhatnagar Prize for Science and Technology; The World Academy of Sciences (TWAS) Prize in Chemistry; Padma Shri; Nikkei Asia Prize 2020; Fellow of all the science and engineering academies of India, RSC, TWAS and AAAS; J. C. Bose National Fellowship, B. M. Birla Science Prize, Young Scientist Award of the Chemical Research Society of India, Molecular and nanoscale materials, clean water, surfaces, instrumentation, business incubation. He earned a Ph. D degree in chemical physics working with Professors C. N. R. Rao and M. S. Hegde at the Indian Institute of Science, Bangalore. Subsequently, he spent about two years as a post-doctoral fellow at the University of California, Berkeley and Purdue University, Indiana.



Satyanarayanan Seshadri is the faculty advisor for the Nirmaan pre-incubation center at IIT Madras. He is an Associate professor in the Department of Applied Mechanics at IIT Madras and the principal investigator of the Energy and

Emissions Research Group (EnERG) at IITM, whose main focus is on development of technologies enabling energy efficiency and emission mitigation in industries. Satya started his career with GE in their Global Research Center, in the domain of Energy Systems and waste heat recovery and continued with Forbes Marshall, a leading company in steam systems in India. Thereafter, Satya transitioned to an academic role working on energy recovery systems for process industries, deep decarbonization of process heating using high temperature and steam generation heat pumps and waste heat recovery from multi-source resources using advanced Organic Rankine Cycle (ORC) architectures. He works with various industries and industry bodies such as SICCI, CII to promote continuous energy and resource assessments through the Industrial Energy Assessment Cell (IEAC) and Center for Technology and Policy (CTaP). He earned a PhD from Texas A&M University in Aerosol Science.

Advisory Board

“

We don't have to do all of it alone.

We were never meant to.

BRENE BROWN



Aswath Damodaran is the Kerschner Family Chair Professor in Finance Education at the Stern School of Business at New York University. Damodaran is best known as author of several widely used academic and practitioner texts on Valuation,

Corporate Finance and Investment Management; he is widely quoted on the subject of valuation, with “a great reputation as a teacher and authority.” He has written several books on equity valuation, as well as on corporate finance and investments. He has also widely published in leading journals of finance. He was profiled in Business Week as one of the top 12 U.S. business school professors. Damodaran holds M.B.A. and Ph.D. degrees from the UCLA Anderson. In India he has studied at the Loyola College, Chennai and the Indian Institute of Management Bangalore.



Avnish Sabharwal is the Managing Director of Accenture Ventures. He is also an innovator, strategist and a technology evangelist with more than 25 years of experience in Innovation, Digital Transformation, Corporate Strategy, and Leadership

Development for Top 500 Fortune clients in both mature and emerging markets. He has also advised many Global Captives on their Innovation and Digital Roadmap. Currently he is responsible for designing and leading the Innovation agenda for Accenture in Growth Markets including partnering with the Start-up ecosystem. His role includes scaling Accenture's digital and innovation capabilities and work extensively with the Indian and Global start-up ecosystem. Prior to Accenture, he worked with IBM in India and the United Kingdom for almost a decade in various leadership roles. He has been instrumental in opening up the startup

collaboration between India and Israel and is regarded as an expert on the global DeepTech startup eco-systems. He was awarded the Most Innovative Leader Award, 2018, by World Innovation Congress. He has an MBA with distinction from Warwick Business School, UK and Specialization in Strategy from Harvard Business School and Insead and on Innovation from MIT.



Gerard “Gerry” George is currently Professor at the McDonough School of Business at Georgetown University. Previously, he was Dean and Lee Kong Chian Chair Professor of Innovation and Entrepreneurship at the Lee Kong Chian School of

Business at Singapore Management University. From 2013 to 2016, he was Editor of the Academy of Management Journal, the flagship empirical journal in the field of management. In 2010, he was awarded a prestigious Professorial Fellowship by the UK's Economic and Social Research Council for his research on low cost innovation and inclusive growth. For his work in India and Africa on inclusive innovation, he was conferred the honorary title of Fellow of the City & Guilds of London Institute in 2015. He was awarded honorary doctorate in economic sciences by the University of St.Gallen, Switzerland. Gerard George has numerous academic papers to his credit. His recent books include ‘The Handbook of Inclusive Innovation’, ‘The Business Model Book’, and ‘Managing Natural Resources’. An award-winning researcher and teacher, Professor George has published over 100 articles with 30,000 citations. In 2019, he received the Web of Science “Highly Cited Researcher” distinction for Cross-Field Impact. His areas of research are in innovation, entrepreneurship, sustainability and tackling grand challenges in society.



Gopal Srinivasan is the Founder, Chairman and Managing Director of TVS Capital. A passionate entrepreneur and an avid angel investor, he is actively involved in the promotion of Entrepreneurship. He is the Founding member of

“The Chennai Angels”, one of the premier angels investing networks in India. He is a Governing Council member of Reserve Bank Innovation Hub (RBIH), a centre for idea generation and development to provide the facilitating environment, encourage collaboration, and in the process promote innovation in the financial sector. Gopal is also a non-official member on the National Start-up Advisory Council (NSAC), formed by the Department for Promotion of Industry and Internal Trade (DPITT) to advise the Government of India on measures needed to build a strong eco-system for nurturing innovation and start-ups in the country. He is a member of University of Michigan’s India Advisory Board. Gopal is also the Chairman of Chennai International Centre. Gopal has been recently appointed as the Honorary Consul General for the Kingdom of Netherlands in Tamil Nadu. Gopal is an MBA from the Graduate School of Business Administration, University of Michigan, Ann Arbor, USA.



Josh Lerner is the Jacob H. Schiff Professor of Investment Banking at the Harvard Business School. He is a member of the European Corporate Governance Institute. Much of his research focuses on venture capital and private equity organizations.

He co-directs the National Bureau of Economic Research’s Productivity, Innovation, and Entrepreneurship Program and serves as co-editor of their publication, Innovation Policy and the Economy. He founded and runs the Private Capital Research Institute, a nonprofit devoted to encouraging access to data and research, and has been a frequent leader of and participant in the World Economic Forum projects and events. Among other recognitions, he is the winner of the Swedish government’s Global Entrepreneurship Research Award and Cheng Siwei Award for Venture Capital Research. Josh Lerner graduated from Yale University, and he earned a PhD in Economics from Harvard University.



Kris Gopalakrishnan is widely recognized as a global business and technology thought leader for his role in growing the IT services industry worldwide. He co-founded Infosys, where he served as the chief executive officer, managing

director and also as a vice chairman at different periods. Following his retirement from Infosys, Kris has been very active in promoting the Indian startup ecosystem, and philanthropically supporting research on brain sciences, aging related disorders, and healthcare in India. Government of India awarded Kris Gopalakrishnan the Padma Bhushan, the country’s third-highest civilian honour. He was voted the top CEO, IT Services category in Institutional Investor’s inaugural ranking of Asia’s Top Executives and selected as one of the winners of the second Asian Corporate Director Recognition Awards by Corporate Governance Asia in 2011. He actively shapes the technology and startup ecosystem through a myriad of roles. Kris Gopalakrishnan has served in leadership roles in several research, educational, industry, startup institutions and forums.



Sarath Naru is the Founder and Managing Partner of Ventureast, one of India’s longest-standing venture capital institutions investing in pioneering sectors since the mid-90s. Ventureast manages over \$300 million having made

close to 100 investments. As an entrepreneur, he has built a trading business between India and the USA, covering engineering & fashion goods, and printing related services. Sarath has a B.Tech from IIT, Madras and an MBA from the University of Chicago. He has been associated at Board level positions with the IVCA, ABLE, IITM Research Park, ICRISAT, PanIIT Association, Ascent Capital, Equitas Micro-Housing, Annapurna Microfinance, among others.

Executive and Technology Team

“

When you hand good people possibility,
they do great things.

BIZ STONE



Shanmugapriya R., Chief Operating Officer, has a Bachelors' degree in Computer Science Engineering and a Masters' degree in Software Engineering, followed by more than a decade of experience in various positions in industry and academic

Institutions. She is a university rank holder during her post-graduation from College of Engineering Guindy, Anna University. Her responsibilities at the centre encompass a diverse range of critical functions aimed at ensuring the seamless execution and success of projects. At the core of her role is the meticulous maintenance and organization of all project-related records, fostering an environment of transparency and accountability. She serves as the primary point of contact for all stakeholders, involved in project coordination, facilitating effective communication and collaboration among internal teams and external outsourcing partners. Beyond internal stakeholders, she actively engage with external parties to explore collaboration opportunities that can enhance project outcomes.



Chaitanya, Senior Project Scientist, is a Dual Degree graduate from the Electrical Engineering Department, IIT Madras and is part of the leadership team at YNOS Venture Engine, a startup building products for early-stage entrepreneurs,

investors, innovators and other ecosystem players. He played a prominent role in architecting, developing & deploying the technology stack & the intelligence engine of YNOS and is one of the key contributors in building YNOS's scalable Machine Learning algorithms for semantic search, identifying right-investors, estimating valuation, discovering similar startups and so on. His skillset includes Natural Language Processing, Machine Learning, Web-development, Database & Server management, and Systems architecture. He is also an active open-source contributor, with some of his Python packages crossing 30k downloads in total. At CREST, he currently leads the technology team in developing the information platform on the Indian Start-Up and Venture Capital ecosystem.



Satyam Anand, Data Scientist, has earned Bachelors' and Masters' in Computer Science and Engineering. Subsequently he worked as a faculty member in Presidency University, Bangalore for 2 years where he taught Python, Data analysis,

Machine Learning to the undergraduate students. His areas of interests include data analysis and machine learning. As a Data Scientist at CREST, he is involved in data acquisition, processing, and management. Part of his activity involved developing customized tools for data acquisition.



Krishna Kireeti, Designer, is a self taught designer with a special interest in UI/UX Design. His passion for design fortified during his days as a student at IIT Madras where he was part of multiple Institute design teams and Start-ups. He's

been helping teams grow with his expertise in design and user experience ever since. He also runs Typekiln, an Independent type studio in his spare time. His responsibilities in CREST include conceptualizing and creating compelling visuals for both print and digital mediums ensuring effective communication by the organization.



Manikandan M., Software Developer, holds a Bachelor's degree in Computer Science and Engineering from SRM Institute of Science and Technology. He is currently pursuing a Master's degree in Data Science and Engineering at BITS,

Pilani. He worked at HPCE, Computer Center as a Project Technician, where he was responsible for maintaining the IIT Madras supercomputer. He assists CREST by developing and maintaining the website, ensuring it is up-to-date, functional, and user-friendly. Mani's responsibilities include designing new features, troubleshooting technical issues, implementing security measures, and regularly updating the site's content.

Research Team

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To do successful research, you don't need to know everything, you just need to know one thing that isn't known.

ARTHUR L. SCHAWLOW



Aarthi Ramachandran is a Ph.D. Scholar at IIT Madras in the field of Health Infrastructure. She did her under graduation in Bio-Medical Engineering and her post-graduation in Public Health from Manipal Academy of Higher Education.

Before joining for the Ph.D. program she was the project manager for a multi-year project on Enhancing the Profitability and Sustainability of Grassroots Women Entrepreneurs. She is passionate about exploring entrepreneurial approaches in the areas of public health social infrastructure.



Madhavan Nampoothiri is a Joint PhD Scholar at the Indian Institute of Technology Madras and the University of Passau, Germany. He has an experience of over two decades in the Energy sector, with a specific focus on combating global

climate change through decarbonisation of energy systems. His area of academic research is sustainable finance that encompasses corporate ESG ratings, global ESG disclosure mandates (especially Europe) and their effect on corporate financial performance, and the evolution of the Indian environmental entrepreneurship ecosystem.



Arushi Gupta is a Ph.D. Scholar at IIT Madras. She holds a post-graduation in Economics from the Madras School of Economics. She worked as an Analyst at a financial services firm before joining IIT Madras. She is presently pursuing

her Ph.D. in Finance. Her research focus is on the role of patents in startups.



K.S. Nandhini, is a M.S. Scholar at IIT Madras. She is a gold medalist with a Bachelor's in Engineering, has been involved with the startup ecosystem at IIT Madras since 2018. Currently, she oversees strategic operations at the Office

of Innovation and Entrepreneurship. Her research focuses on understanding the factors that contribute to the success of incubators, particularly within academic settings. This includes examining how student entrepreneurs' socio-economic backgrounds, venture-specific characteristics, and traditional factors like market fit and team dynamics all influence the varying success rates of early-stage student startups.



Haritha V H, is a Ph.D. Scholar at IIT Madras. She has completed her M.Com in Finance from the Central University of Karnataka and B.Com from MG University, Kerala. She has qualified for Junior Research Fellowship in Commerce and was

an University Rank Holder during her Post Graduation. Her research focuses on Risk Management Strategies of Business Angels.



Nandhini Priya N. is a Ph.D. Scholar at IIT Madras. After completing her undergraduate studies at the University of Madras, Nandhini Priya went on to earn a post-graduate degree in commerce with a focus in accounting and finance. She is an

Intermediate qualified Cost and Management Accountant and qualified for a Junior Research Fellowship in the stream of Commerce. She is pursuing her Ph.D. at the IIT Madras and has a keen interest in exploring entrepreneurial ventures in the field of urban infrastructure.



Niroopa Rani A. is Ph.D. Scholar at IIT Madras. She is a Cost Accountant, Company Secretary with two Post Graduation degrees - Business Administration with a specialization in Finance, and in Commerce, both from the University of Madras. She

has also done short term course at Edinburgh Business School, Scotland on strategic financial management, inventory control and working capital management. She has also successfully completed certificate courses on microfinance and financial inclusion at the Boulder's Institute of Micro Finance, Turino, Italy and at the Indian Institute of Banking and Finance (IIBF), India. Her Ph.D. work focused on early stage venture funding, specifically angel investments. Her area of interest includes Entrepreneurship, Venture Capital & Angel Investments, and Corporate Finance.



Dr. Ramesh Kuruva is a Project Scientist at CREST. He is a Ph.D. holder in Entrepreneurial Finance specializing in Venture Capital and Private Equity, brings extensive expertise to the table. He contributed significantly as a

research team member for the influential India Venture Capital and Private Equity Reports in 2016 and 2017, and also served as a sub-editor for the 2018 Report. He played a pivotal role in the establishment of YNOS Venture Engine, a startup focused on supporting entrepreneurs, angel investors, incubators, and other ecosystem players. His research findings have been showcased at prestigious international conferences, including the ISDSI International Conference at IIM Trichy, India Finance Conference at IIM Kolkata, and 3rd Entrepreneurial Finance Conference in Milan, Italy. He has made noteworthy contributions to leading journals such as the Journal of Alternative Investments. Additionally, as a Scientist at CREST, he collaborates with faculty, research scholars, and visiting scholars, actively engaging in diverse research activities and programs.



Reeba Devaraj is a Principal Project Scientist at CREST. She is an economics graduate with more than 18 years of experience in development and social research. She has worked with leading research companies and academic

institutions and has designed and implemented qualitative and quantitative research studies at both the regional and national levels and has a strong track record of analysing data with a special focus on statistical analysis.



Sathya Anbajagane is a Project Officer at CREST. She is an engineering graduate with a decade of experience in IT industry in the US. She has played leadership roles in social enterprises and development sectors in India for

the past two decades, focusing on child education, women empowerment and organic farming segments. Sathya is passionate about entrepreneurship and was a consultant for DOMS IITM project "Enhancing the Profitability and Sustainability of Grassroots Women Entrepreneurs".



Sudipta Das is a Project Officer at CREST. She is an experienced Community Manager with a background in managing entrepreneurial communities and project management. She holds a Master's degree in English Literature

and possesses strong skills in community engagement, event planning, and content development.



PART C

Activities

“

To achieve great things, two things are needed;
a plan, and not quite enough time.

LEONARD BERNSTEIN

Research Projects and Knowledge Creation

- Completed Projects
- Ongoing Projects

“

After all, the ultimate goal of all research is not objectivity, but truth.

HELENE DEUTSCH

Completed Projects

Startup India

Thillai Rajan A., Sathya Anbajagane, and Reeba Devaraj

Start-ups and its financing have been an area of policy importance for the Government of India in recent years. The thrust of the government policy making can also be seen in the impact – India has emerged as one of the largest as well as fastest growing start-up ecosystems in the world. In this research and documentation project, we trace the Start-up policy evolution and how it has emerged as one of the important pillars for the government. While Start-ups also remain as an area of interest for the various state governments, this documentation and research largely focuses on the “Start-up Program” of the Government of India. The research was conducted mainly through a detailed analysis and study of various secondary sources, archives and policy documents pertaining to Start-up India. Furthermore, we also analysed the impact of the policy based on data obtained from various sources.

Venture Capital Valuation, Structuring and Exits

Ramesh Kuruva and Thillai Rajan A.

Three critical aspects of venture capital investments are valuation, security selection, structuring, and exit. Valuing a new venture with limited information is always difficult. The process of valuing a venture and writing contracts between VC and Entrepreneur is an intensive process. Since India

receives a significant pile of capital inflows, tax implications in VC investments need be considered. The VC hopes to design a contract that reflects the firm’s true value, protect investments on the downside, and reflects all of this in the exit returns. It’s fascinating to learn about start-up valuation and the signals that VCs consider before investing. The information asymmetry in venture capital investments has been extensively explored. Securities and the capital structure enable entrepreneurs and investors to optimise their incentives. Contracts, in particular, mitigate downside risk for investors. Given the tax implications, security selection and structuring is a critical component of venture capital investing. In this study we analyse how valuation and risk mitigation strategies, viz., security selection and structuring, impact exit returns for the VC investor.

An Analysis of the Angel Investments in Indian Startups

A. Niroopa Rani and Thillai Rajan A.

Angel investments are increasingly getting specialized. In recent years, start-ups are raising pre-seed funding before seed-stage funding. Investors in pre-seed and seed-stage companies commonly are angel investors. Majority of the angel investors prefer to jointly invest with other investors as a syndication rather than being solo investors given the various benefits of such a syndication. In this study, we develop an index that assesses the robustness of angel

syndication by capturing various parameters of the investors who are part of the syndicate. Further, though India being third largest startup ecosystem of the world, the literature on angel investments have been limited. This study contributes to the literature of angel investments in India by analysing the differences between pre-seed and seed stage angel investors through the development of a composite syndication index.

Exploring the nuances of women entrepreneurship in India

Jasmine Banu and Rupashree Baral

Entrepreneurship helps women to realize their potential and fulfill their dreams by providing them earning opportunities, improving the standard of living of their family which ultimately has implications for society. Women entrepreneurs are increasingly contributing to the economic growth of the nation worldwide, and there is further scope to increase their representation in entrepreneurship. Government of India (GOI) has taken enormous efforts towards women empowerment and entrepreneurial development by introducing several schemes under the Ministry of Micro, Small, and Medium Enterprises (MSMEs). Yet many such sponsored development activities have failed to reach all sections of women.

Ongoing Projects

Impact and Overview of the Start-up Economy in India, with special reference to the Digital Start-ups

Thillai Rajan A.

The Startup India initiative is envisioned to catalyse the start-up culture, with start-ups being recognized through the initiative and entrepreneurs availing the benefits of launching and conducting their own business in India with ease. In recent years, India has seen a steady increase in the number of start-ups incorporated, especially in sectors such as IT and ITES. The annual growth rate of start-ups as of early 2022 was around 15.5 percent. The number of registered start-ups grew from 223 in August 2016 to more than 83000 in December 2022. Several policy changes and new schemes have been introduced by 129 different ministries, to encourage and support start-ups. Government's support is critical in providing the essential funding, mentorship, and market access support required by start-ups. In line with the same, the Ministry of Electronics and Information Technology (MEITY) start-up support programs contain various provisions to incentivise key start-up stakeholders such as incubators and institutions of higher education among others so as to promote holistic development for India's start-up ecosystem. The objective of this study is to analyse the start-up landscape and understand the impact of the Start-up

While such schemes and support from institutions have given women the much-needed economic empowerment, it is largely observed that women entrepreneurs have to confront several personal, familial, societal, and cultural obstacles. So, there is a constant need to investigate the reasons (drivers) for the factors that impact women entrepreneurship and identify the factors that contribute to their business performance. This study also seeks to explore the work-life balance of women.

Startups and Incubators

Abhishek Gupta and Thillai Rajan A.

Incubation has emerged as an important area for policymakers. Having a sound understanding of the evolution of start-up and incubation ecosystem journey over the years can help set policies and best practices for the future. Moreover, improving the effectiveness of incubators would therefore help in the success of more start-ups. The performance of incubators and the factors that affect the performance of incubators is therefore a topic of important policy interest. This study analyzes the performance of incubators in higher educational institutions (HEIs) as they generate and collect knowledge, offer scope for innovation, ideation, and commercialization for venture creation.

policy introduced by the National Government in 2016, with a specific focus on start-ups in digital technologies.

Patents and Startup Performance: Evidence from the Indian startup ecosystem

Arushi Gupta and Thillai Rajan A.

Entrepreneurship and startups are considered drivers of technological innovation and economic growth in today's economy. Through these engines of economic growth, cities attract fresh ideas, talent, technology-driven businesses, and venture capital (VC) funding. Several studies have shown that along with business acumen and creativity, intellectual property rights play a role in helping firms survive competition in the market. There is an increasing number of patents filed by start-ups in India; the number of patents filed by Indian start-ups increased by 353% between 2015 and 2019. Startups patent for a variety of reasons: to gain a competitive advantage, prohibit competitors from utilizing their technology, raise capital by indicating to investors the appropriability of their technology and own an asset that adds to the company's value. In this study, we analyze the impact of patents published by start-ups on their financial and valuation performance.

Alternate Approaches for Valuing Start-ups: Investigating the Effectiveness of Risk Neutral And Cascade Neural Network Approach

Haritha V.H. and P. Krishna Prasanna

A typical valuation procedure of a startup involves an analysis of potential future cash flows, an analysis of comparative firms' stock prices, or an analysis of the price-to-earnings ratio of the venture. The valuation of a new venture with significant growth opportunities, high uncertainty and no real cashflow using foggy discount rate estimations seem to defy all the common wisdom on growth firm valuation. Rather than anchoring the Risk-Return equation of such high-growth, high-uncertainty firms in some impassable plan, the study intends to conduct an empirical analysis of the risk and return profile of start-ups in the Indian scenario using a risk-neutral model and backing it up with the findings of the cascade neural network model. This would provide a systematic reference guide for entrepreneurs as well as risk capital investors in India.

Motivating factors of sustainable entrepreneurs

Madhavan V Nampoothiri and Thillai Rajan A.

The decision to startup in one of the SDG areas can be driven both by external and internal factors. The regulatory environment, societal needs for more sustainable solutions or other drivers constitute the external factors, while the intrinsic motivation could be either an idealistic or altruistic orientation or pure economic orientation or a combination of both. There have been studies in the past that examine entrepreneurship in the sustainable development area. These studies have been based on western markets and there is a dearth of literature that focuses on the Indian startup ecosystem. This study addresses the gap by examining the drivers of sustainable entrepreneurship (specifically environmental entrepreneurship) in the Indian context and looks at demographic factors including age, gender, education and prior experience, and the behavioural factors like altruism, idealism, and economic reward maximisation.

Role of Start-Ups and Entrepreneurship in Achieving Health Equity

Aarthi Ramachandran and Thillai Rajan A.

Health Equity is the absence of unfair, avoidable, or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically or by other dimensions of inequality (e.g., sex, gender, ethnicity, disability, or sexual orientation). It also requires attention to health inequities, which are differences in population health status and mortality rates that are systemic, patterned, unjust, and actionable, as opposed to random or caused by those who become ill. Health equity is an issue in many countries and is affected significantly by the

global economic and political system. Startups have unique capabilities such as revenue generation, poverty alleviation, and strengthening the local economy, that can help them achieve health equity. This proposed research focuses on how these startups and entrepreneurship can contribute to health equity and address inequities in health.

Differential Uptake of Circular Practices Between Indian Start-ups and Incumbents

Nandhini Priya N. and Thillai Rajan A.

In today's world, where industrialization and technological advancements strain resources, the urgency for sustainable transformation is paramount. Businesses hold a significant social responsibility to positively impact the communities they serve. For countries like India, aligning with the UN Sustainable Development Goals poses a significant challenge due to its vast and varied population. However, through resolute initiatives from all stakeholders, progress towards the UN 2030 targets is underway. Embracing the circular economy concept, which minimizes waste, optimizes resources, and restores natural systems, promises accelerated sustainable development. Companies can lead by integrating circular design principles, promoting product reuse and recycling, and innovating business models. Policymakers must support these efforts by incentivizing resource efficiency and facilitating access to financial resources. In the context of India's rapid economic growth and thriving start-up scene, this study aims to explore how established companies (incumbents) and (start-ups) new ventures are embracing circular principles by seeking to identify the factors driving Indian manufacturing firms towards circular economy practices and examine the business strategies of both circular start-ups and incumbents for achieving circularity.

Founder Demographics and Ecosystem Factors for Success of Student Startups from Higher Education Institutions

K. P. Nandhini and Thillai Rajan A.

Over the past decade, student entrepreneurship has seen a successful evolution. Many higher educational institutions have recognized this potential and are actively imparting entrepreneurship knowledge to their students. The resulting success of these student startups has motivated a growing number of young people to pursue entrepreneurial ventures. This research delves deeper, investigating the factors that influence the success of student startups beyond just access to resources. It examines how student entrepreneurs' socio-economic backgrounds, venture-specific characteristics, and traditional factors like market fit and team dynamics contribute to the varying success rates of early-stage student startups.

Information Platform on the Start-up Ecosystem



The new source of power is not money in the hands of a few, but information in the hands of many.

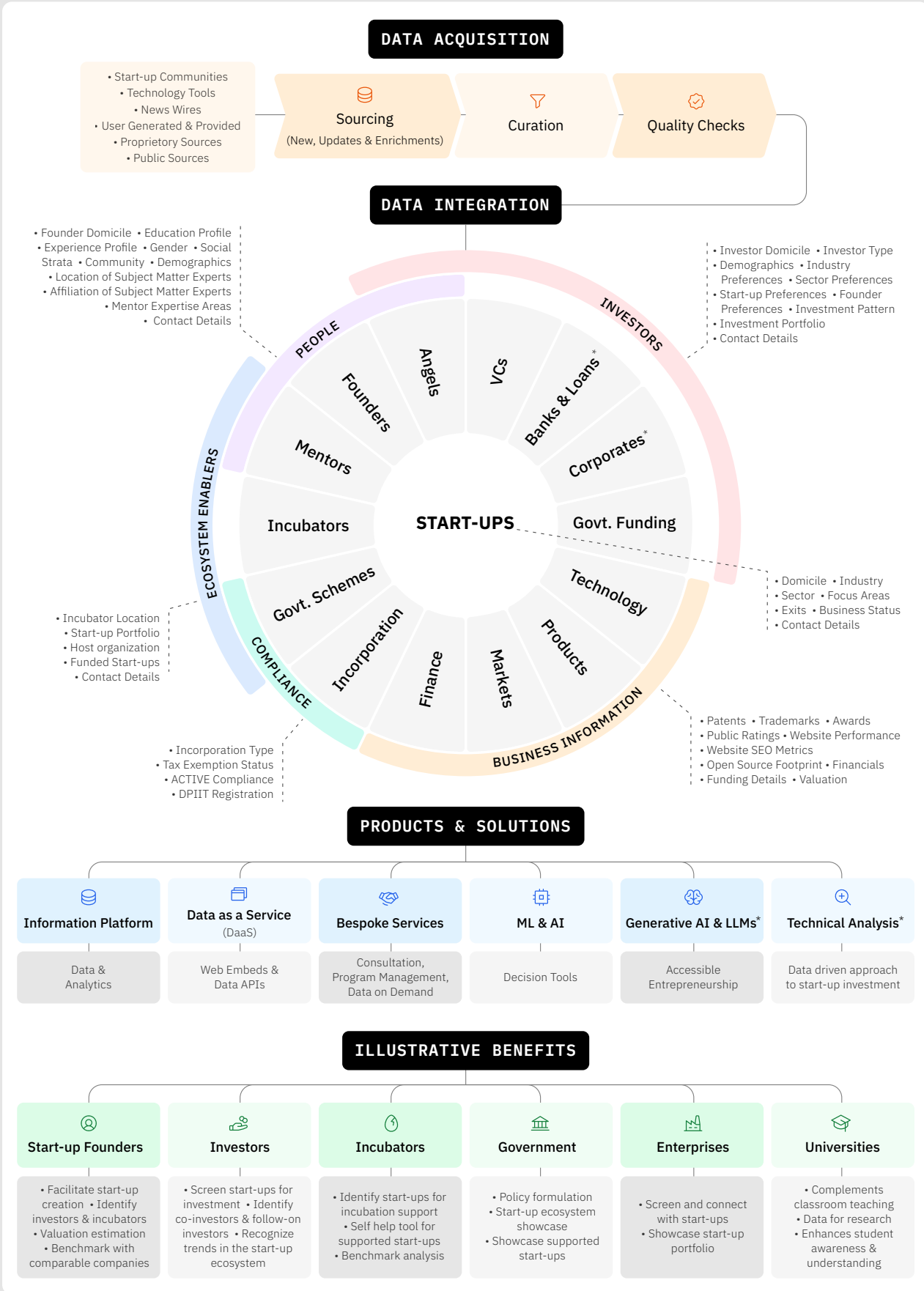
JOHN NAISBITT

Information Platform on Start-ups and Investors

One of the ambitious efforts of CREST has been to develop an information platform for start-ups and investors. The genesis for the effort could be summed up as follows: Firstly, information on the Indian startup ecosystem is very scattered. Integrating information from multiple sources, is a herculean task, one which cannot be accomplished by a few individuals. IIT Madras, India's top-ranked higher educational institution, with a significant depth of resources, threw its weight behind the vision to make the platform a reality. It has now become a public infrastructure of sorts for the start-up ecosystem of the country. Secondly, researchers needed high-quality information to embark on research projects on the Indian start-up ecosystem. As researchers, we have felt the acute need for a robust information platform and used the opportunity that CREST provided to develop such an information platform. Thirdly, it was felt that the development of such a platform would help CREST to achieve its mandate of becoming a research center of eminence globally by being able to provide high-quality data for universities and researchers worldwide. Fourthly, it would help to democratize entrepreneurship and start-up creation. Existing information sources on start-ups and funding transactions were very expensive and beyond the reach of entrepreneurs. Entrepreneurs were therefore at a significant information disadvantage when compared to investors, who could access high-priced information.

Since its inception, the information platform has grown multi-fold and it has become the most comprehensive platform for start-ups and investors in India. As of May 2024, the platform contained information on 208,127 start-ups, 325,231 start-up founders, 1,103 incubators, 11,218 angels, 5,024 VCs, 66,514 transactions, 103 government schemes, and 584 debt funding sources. A unique feature of the platform has been to integrate information about incubators, government funding schemes, and debt funding into the start-up narrative.

Right from the beginning the vision was clear that the platform cannot be developed as yet another research project, to benefit only the researchers at CREST. To quote Keith Ferrazzi, "Power today comes from sharing information, not withholding it." Our mission was to make the platform accessible to every incumbent or prospective stakeholder engaged with the Indian start-up ecosystem. The users should get the same experience as what they would get in any other comparable commercial software platform – accessible 24*7, and a high-quality user experience. To make this possible, the platform has been developed in partnership with an external organization, YNOS Venture Engine, an IIT Madras Incubation Cell-supported start-up. Developing the platform in partnership with a partner corporation has helped in attaining high-performance levels that would not have been possible had it been developed as an internal research project.



*The feature is currently being developed and is planned for a future release

Schematic diagram of the information platform on start-ups and investors

The screenshot displays the 'Startups' platform interface. At the top, there are navigation links for 'All Startups', 'Bookmarks', and 'Add your Startup'. A search bar contains the text 'Eg. Online classes, Grocery, Ather Energy, Agriculture'. Below the search bar, there are tabs for 'Find Startups by' with categories: 'Startup Background', 'Founding Team', 'Revenues & Funding', 'Performance', 'Industry', and 'Technology'. Under 'Startup Background', there are several filter dropdowns: 'Startup Type', 'Incorporation Year', 'Startup Sector', 'Startup Sub-Sector', 'Startup State', 'Startup City', 'Incorporation Type', 'Incubation', 'Social Media Presence', 'Business Model' (marked as Beta), and 'Actively Fundraising' (marked as New). A 'Refresh' button is located at the bottom right of the filter section. Below the filters, it says 'Showing 2 out of 208,124 Startups'. The first startup listed is 'PerspectAI' (LOOP REALITY PRIVATE LIMITED), located in Hyderabad, founded in 2016, with last funding in Dec, 2020. A 'Buy MCA Filings (₹449)' button is visible next to the startup name. A brief description of PerspectAI is provided below the startup name.

A snapshot of the start-ups product. Start-ups can be easily filtered by Start-up Background, Founding Team, Revenues & Funding, Performance, Industry Segment, and Technology. Each of these categories contain multiple filters. Combining filters across categories helps to quickly screen the start-ups of interest.

The screenshot displays the 'Angels' platform interface. At the top, there are navigation links for 'All Investors', 'My Recommendations', and 'Bookmarks'. A search bar contains the text 'Eg. Anurag Chauhan, Cricket, Actor, Finance'. Below the search bar, there are tabs for 'Filter Angels by' with categories: 'Angel Background', 'Startups they Invest', 'Founders they Invest', 'Investment Pattern', and 'Industries they Invest'. Under 'Angel Background', there are several filter dropdowns: 'Angel State', 'Angel City', 'Angel Age', 'Angel Gender', 'Angel Community' (marked as Beta), 'Angel Education', and 'Angel Network' (marked as Beta). A 'Refresh' button is located at the bottom right of the filter section. Below the filters, it says 'Showing 2 out of 11224 Investors'. The first investor listed is 'Harshil Mathur', located in Bengaluru, 33 years old. A 'Personalised Note' button is visible next to the investor name. Below the investor name, there is a summary of investment statistics: 24 Recent Investments, Apr, 2024 Latest Investment Date, ₹238.85M Avg. Round Investment, and 1y 9m Avg. Age of Startup. A brief bio of Harshil Mathur is provided below the statistics. An 'Active' status indicator and a 'Details in Public Profile' button are also visible.

This snapshot showcases the product for Angel investors. Angel investors can be filtered by their background, the startups they invest in, the founders they support, their investment patterns, and the industries they focus on. Finding the perfect Angels for their startups is now easy with the extensive filters available in each category.



Kalyan Krishnamurthy

Singapore



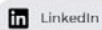
Personalised Note

19 Recent Investments **Jan, 2022** Latest Investment Date **₹13014.47M** Avg. Round Investment **3y 4m** Avg. Age of Startup

Mr. Kalyan Krishnamurthy is the CEO of Flipkart. Prior to joining Flipkart, Mr. Krishnamurthy served as the Director of Finance and Portfolio Companies at Tiger Global Management. Prior to Tiger Global, Mr. Krishnamurthy held various senior positions such as Director of Financial Planning and Analysis at eBay Asia-Pacific and Country Finance Director (South-east Asia, Hong Kong) at eBay. He worked at Procter & Gamble. Mr. Krishnamurthy holds an MBA degree from Asian Institute of Management, the P ([Show more](#))

★★★★★ Details in Public Profile

Public Links



LinkedIn

Prominent Investment Areas

AI and ML

Adtech

Apps

Business Support Services

Clothing and Apparel

+23 more investment areas

Recent Experience

CEO

Flipkart, India

Managing Director

Tiger Global Management, India

Education (joining year)

PG (1998)

Asian Institute of Management, Makati, Philippines

PG (1998)

Gies College of Business, United States of America

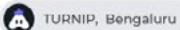
Companies Invested

Group by: New

AI and ML



Adtech



Show All Companies (19)

Key Focus Areas of invested Startups

AI Infrastructure

App-based income and expense management solutions for freelancers and content creators

Artificial Intelligence

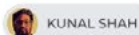
Audio & Video Rooms

Business-in-a-box Platform

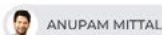
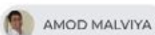
+86 more focus areas

Previously Kalyan Krishnamurthy has invested jointly with

In more than two startups



In one or two startups



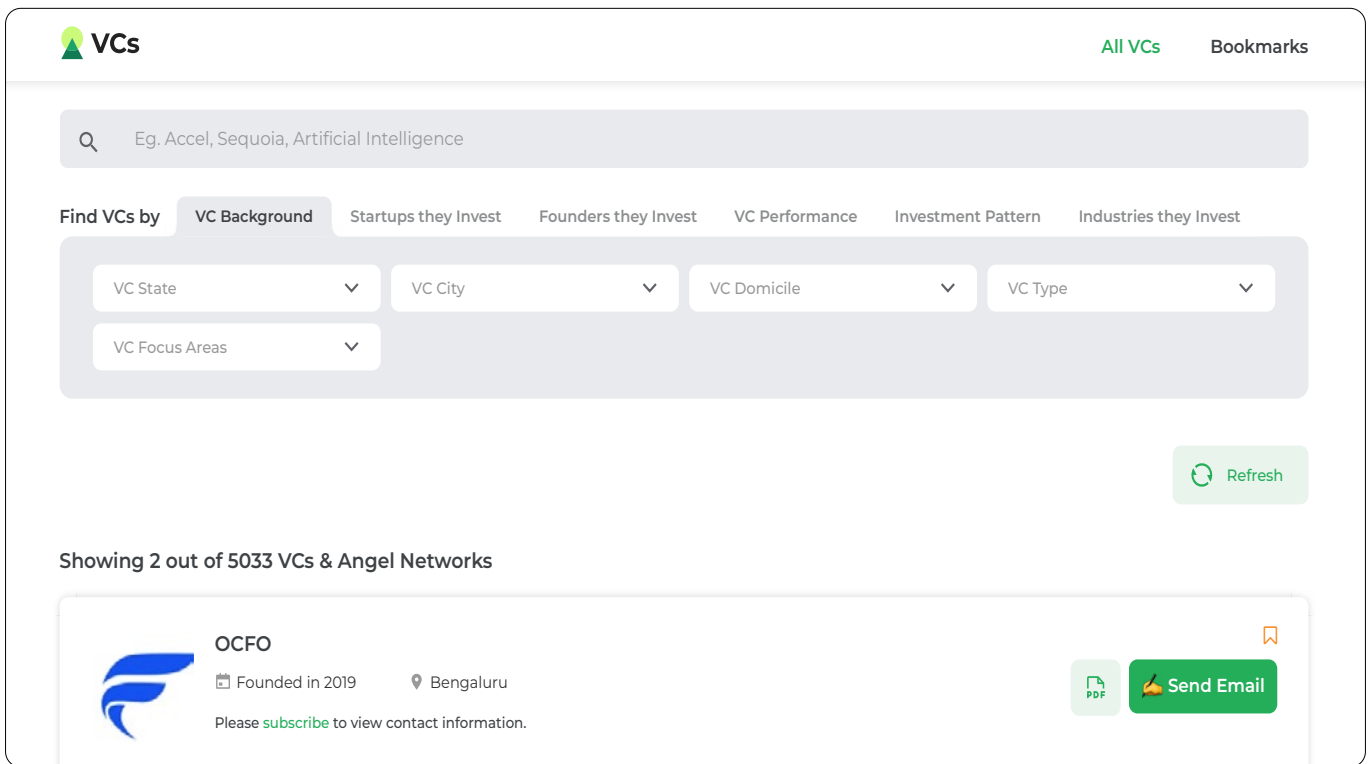
+72 more angels

Investors who invested in subsequent rounds after Kalyan Krishnamurthy

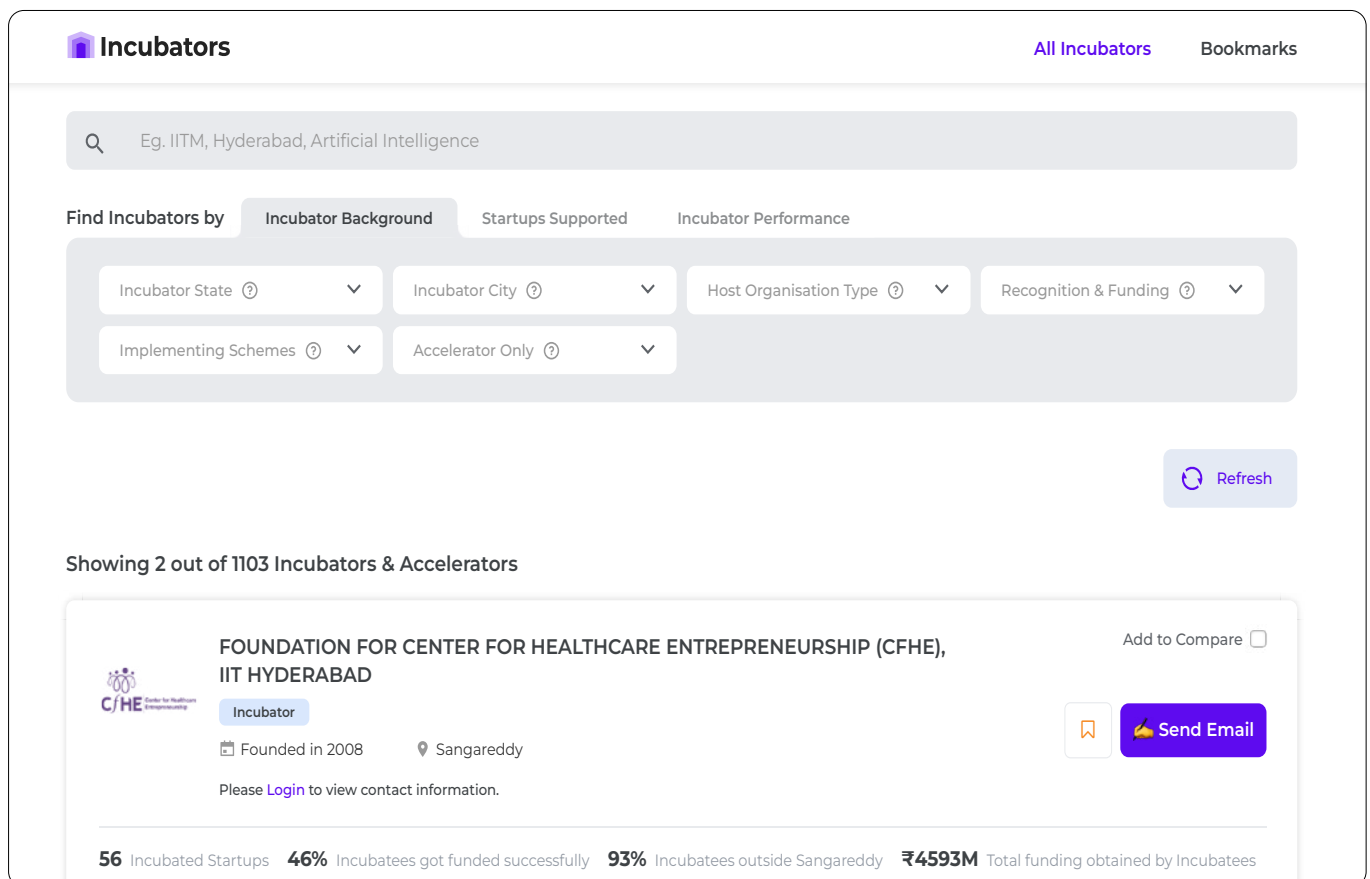


+25 more angels

A typical profile of each angel investor included in the platform. It includes a brief description about the investor, public links to their social media pages, key investment areas, education and recent experience, companies they have invested in (which can be filtered and grouped by various categories), the primary focus areas of these startups, co-investors that they have jointly invested with, and the investors who participated in subsequent funding rounds.



This screenshot is of the VCs product. VCs can be filtered by their background, the startups and founders they invest in, VC performance, investment patterns, and preferred industries. Additionally, a sort option allows results to be organized by categories such as the number of investments, age of startups and founders, round size, and deal amount.



The image is a snapshot of the incubators product in the platform. Filters on incubator background, supported startups, and incubator performance helps the start-ups to easily identify relevant incubators.

MANIPAL UNIVERSITY TECHNOLOGY BUSINESS INCUBATOR (MUTBI), UDUPI

Add to Compare



Incubator

Founded in 2010

Udupi

mutbi.mit@manipal.edu

918202925051



Send Email

58 Incubated Startups 64% Incubatees got funded successfully 43% Incubatees outside Udupi ₹346M Total funding obtained by Incubatees

Manipal University Technology Business Incubator is an initiative of Manipal Academy of Higher Education for nurturing and developing innovation and entrepreneurial skills among its faculty and students, as well as people of the region. It is one of the 54 TBI's funded by National Science & Technology Entrepreneurship Development Board, Department of Science & Technology, Government of India to promote Innovation driven Start-ups in Udupi District, established in March 2010. MUTBI has a synergic [\(Show more\)](#)

Public Links



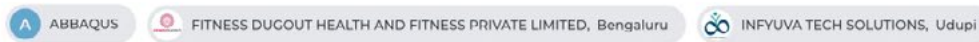
Recognised and Funded by

Department of Biotechnology (DBT) Department of Science & Technology (DST) +1 more agency

Startups Incubated

Group by: Startup Sector

AI and ML



Agritech and Farming



Show All Companies (58)

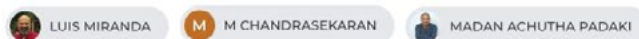
Key Focus Areas of incubated Startups

21st Century Skill Programs 3D Printing & Manufacturing Services Advanced Algorithms to Detect Freeze-Thaw Cycles Agri Robot App Development +37 more focus areas

Funding & Support Schemes implemented by the Incubator



Angels who invested in incubated Startups



Vcs & Networks which invested in incubated Startups



Institutions Financing the incubatee Startups



A standard overview of each incubator available on the platform, featuring a brief description of the incubator, social media links, funding schemes implemented by the incubator, start-ups incubated, funding and support initiatives offered by the incubator, and investors who have backed incubated startups.

Govt. Funding All Govt. Schemes Bookmarks


Q Eg. SIDBI, SISFS, BIRAC

Filter by **Scheme Background** Startups they Support Founders they Support Investment Pattern Industries they Support

Scheme Type Scheme State Scheme Focus Areas

Refresh

Showing 2 out of 103 Govt. Schemes



BIRAC BIOTECHNOLOGY INDUSTRY PARTNERSHIP PROGRAMME (BIPP)

Founded in 2008 | Delhi

Please [subscribe](#) to view contact information.

PDF Send Email

93 Supported Startups **Feb, 2023** Latest Investment Date **₹25.00M** Avg. Round Size **₹25.00M** Avg. Deal Amount

3y 7m Avg. Age of Startup **2** Avg. No. of Founders **53y** Avg. Age of Founders

Screenshot of the Government Funding product. The product categorizes more than 100 schemes based on the type or funding agencies of the schemes, supported startups, supported founders, investment patterns, and supported industries.

Debt Funding All Debt Funds Bookmarks


Q Eg. HDFC Bank, ICICI Bank, State Bank of India

Filter by **Institution Background** Startups they Support Founders they Support Financing Pattern Industries they Support

Institution Type

Refresh

Showing 2 out of 584 Banks and Financial Institutions



DBS BANK INDIA LIMITED

Founded in 1994


Please [subscribe](#) to view contact information.

Download PDF

90 Startups Obtained Loans **Dec, 2023** Latest Investment Date **₹337.27M** Avg. Loan Value **10y 4m** Avg. Age of Startup

2 Avg. No. of Founders **53y** Avg. Age of Founders

A snapshot of the debt funding product. Start-ups can select an appropriate bank by analyzing the institution background, the type of startups and founders they have supported, financing patterns, and the industries they have supported.




KARUR VYSYA BANK LIMITED

Founded in 1916 Karur

contact@kvb.co.in

Show full Contact Info.



89 Startups Obtained Loans

2 Avg. No. of Founders

Aug, 2023 Latest Investment Date

51y Avg. Age of Founders

₹41.55M Avg. Loan Value

7y Avg. Age of Startup

Karur Vysya Bank is a Scheduled Commercial Bank, headquartered in Karur in Tamil Nadu, India. It was founded in 1916 by M. A. Venkatarama Chettiar and Athi Krishna Chettiar. The bank primarily operates in the treasury, corporate/wholesale banking, and retail banking segments.

Public Links

Website
 LinkedIn
 Twitter
 Facebook
 Instagram
 Youtube

Prominent Supported Areas

AI and ML
Agritech and Farming
Apps
Biotech
Business Support Services
+31 more categories

Startups Supported Group by: Startup Sector New

AI and ML

ADM ENTERPRISES PVT LTD
 INTELLI DATALOGIC
 KRYPC, Bengaluru
 MERITUS AI LEARNING EXPERIENCES, Chennai

Agritech and Farming

CREATIVE UNICHEM PRIVATE LIMITED, Rajkot
 DRIFTS LOGISTICS PVT. LTD, Delhi-NCR
 GREENLEAVES, Nashik
 SAIN SOLUTIONS, Pune

Show All Companies (89)

Key Focus Areas of supported Startups

Alternators & Rotary Convertors
Appliances
Assistance to Stock Exchange Intimations
Authorised Ecommerce Seller

Biomass generation power or fuel
+59 more focus areas

Investors in Startups supported by KARUR VYSYA BANK LIMITED

Government Schemes

CDC GROUP
 CREDIT GUARANTEE FUND TRUST FOR MICRO AND SMALL ENTERPRISES (CGTMSE) SCHEME, MINISTRY OF MSME

CREDIT LINK CAPITAL SUBSIDY SCHEME (CLCSS), MINISTRY OF MSME
 INNOVATIONS FOR DEFENCE EXCELLENCE (IDEX) SPARK GRANTS, MINISTRY OF DEFENCE

NIDHI SEED SUPPORT PROGRAM (NIDHI-SSP), DEPARTMENT OF SCIENCE AND TECHNOLOGY
+1 more govt scheme

Individual Angels

AJAI CHOWDHRY
 AMIT PATNI
 ARIHANT PATNI
 MOHIT DAVAR
 NAGARAJA PRAKASAM
+7 more angels

VCs & Angel Networks

BRAND CAPITAL, HYDERABAD
 BRAVIA
 BRITISH INTERNATIONAL INVESTMENT
 CAPRIA VENTURES
 CASPIAN IMPACT INVESTMENTS

+23 more funds

Other Institutions financing Startups supported by KARUR VYSYA BANK LIMITED

SI INFOTECH TRUSTEESHIP SERVICES LIMITED
 ADITYA BIRLA FINANCE LIMITED
 ADITYA BIRLA HOUSING FINANCE LIMITED

AK CAPITAL FINANCE PRIVATE LIMITED
 ANDHRA BANK
+106 more financing institutions

A typical depiction of financial institution profiled in the debt funding product. It includes details such as a brief description of the institution, social media links of the institution, prominent supported areas, portfolio of start-ups that they have invested in, and other institutions and investors who have invested in the start-ups that have taken debt from the profiled debt provider.

Dashboard for **Startups** Angels VCs Govt. Schemes Debt Funds

Startup Sector Incorporation Year DPIIT Registered Angel Funding

VC Funding Govt. Funding Incubation Women Founders

Founder Community Patents Published

[Refresh](#)

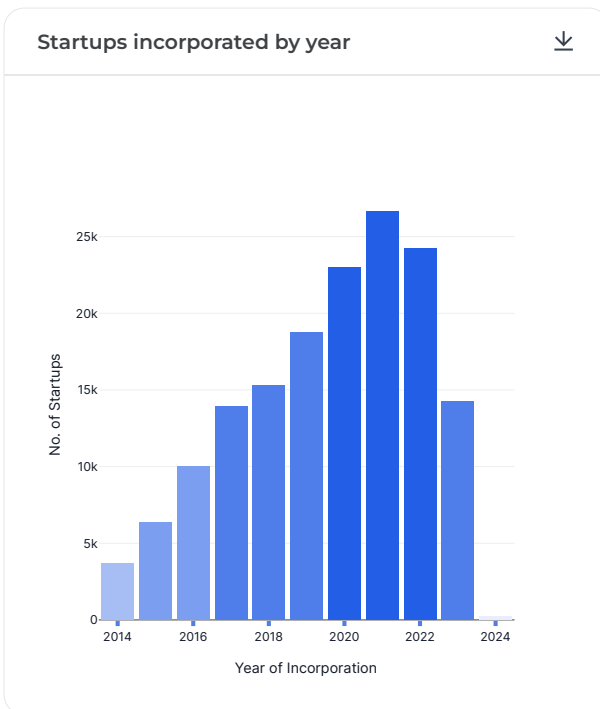
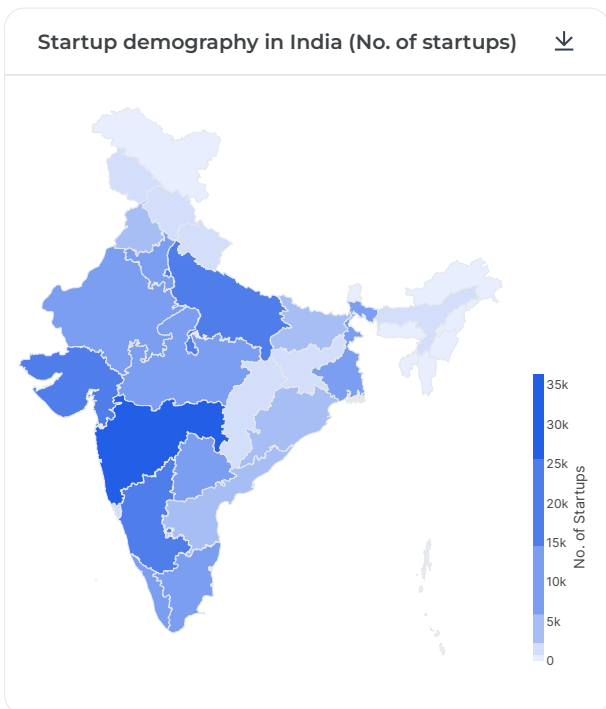
No. of Startups
208,124

Total Investments
(Angels, VCs, Grants)
₹13.80T

Total Secured Loan
(Banks, FIs & Others)
₹7.32T

Avg. age of Startup
5y

Avg. age of Founding Team
42y



Top recently funded startups

S.No	Startup Name	Location	Age of Startup	Last Funding Amount	Last Funding Date
1	Humors Tech	Bengaluru	2 years 8 months	₹20.00M	May, 2024
2	Daffodil Health	Bengaluru	5 years 5 months	₹383.18M	May, 2024
3	KonProz	Delhi	1 year 9 months	₹58.31M	May, 2024
4	VARTHANA	Bengaluru	11 years 5 months	₹270.00M	May, 2024
5	Stanza Living	Delhi	7 years 3 months	₹1,100.00M	May, 2024
6	Trezi	Delhi	9 years 6 months	--	May, 2024
7	Battery Smart	Delhi	4 years 6 months	₹3,763.10M	May, 2024
8	InstaAstro	Noida	3 years 1 month	₹185.00M	May, 2024

Snapshot of Insight, the analytics product. Insight provides a visual representation of data in different products, viz., start-ups, angels, VCs, government schemes, and debt funds.

Entrepreneurship Development

- Fostering Entrepreneurship and Start-up Ideas among the Spouses of GAIL Employees
- Start-up Junction - Live Chat Show Program on the National Television Network
- Executive Business Management Training Program for Tannery Entrepreneurs

“

97% of the people who quit too soon are employed by the 3% who didn't.

UNKNOWN

Fostering Entrepreneurship and Start-up Ideas among the Spouses of GAIL Employees

“

Women, whether subtly or vociferously, have always been a tremendous power in the destiny of the world.

ELEANOR ROOSEVELT

Gas Authority of India Limited (GAIL) is one of the most admired Public Sector Undertakings of the Government of India. With annual revenues of ₹1.35 lakh crore (FY24), it is also one of the largest corporations in India. GAIL ABHA, a collaborative initiative between Gas Authority India Limited (GAIL) and the Centre for Research on Startups and Risk Financing (CREST) at IIT Madras, was conceived to address a pressing need - the untapped potential of spouses of GAIL employees. Many of these women, despite possessing good education and skills, faced limitations due to geographical constraints and societal expectations, hindering their ability to explore economic opportunities.

GAIL ABHA was envisaged as a program to help the women residents in remote GAIL townships to pursue the entrepreneurial path and contribute meaningfully to India's economic landscape while being intellectually and professionally engaged.

GAIL ABHA was conceived as a yearlong program that took participants through a structured and well-paced journey of creating their own ventures. The participants of the program were middle-aged women, and almost all of them were graduates. Several of the participants had professional experience before or after marriage. However, their awareness on start-ups and entrepreneurship was limited, based on the responses provided by them at the beginning

of the program. Most of the participants were confined to the role of homemakers but were yearning to create an identity for themselves in their chosen profession. The remote locations of GAIL townships provided very limited employment opportunities in the immediate vicinity, making them despondent.

When GAIL ABHA offered the residents an opportunity to set up a start-up along with the necessary training and mentorship, many jumped at it with gusto. Through surveys, interviews, and discussions, the initiative uncovered the aspirations and challenges faced by these women.

It became evident that while there was a desire to pursue entrepreneurship, there was a lack of support and resources to translate these aspirations into reality. Armed with this understanding, CREST set out to bridge this gap by offering tailored support and guidance to aspiring women.

Workshops, training programs, and mentorship initiatives were designed to equip women with the necessary skills, knowledge, and confidence to launch and sustain their ventures.

Moreover, the initiative facilitated access to networks, funding opportunities, and mentorship, crucial elements often inaccessible to women in non-metro locations.

The impact of CREST’s intervention has been profound. Several hundred spouses of GAIL employees posted in remote locations across Uttar Pradesh and Madhya Pradesh participated in the initial sensitization program. With newfound skills and networks, these women have launched a diverse range of startups, contributing to local economies and also carving an identity for themselves. The ventures that were setup as a result of GAIL ABHA were in a variety of sectors: Edu-Tech, Agri-Tech, Fashion-Tech, Food-Tech, Kids-Tech, Health-Tech.

In summary, CREST is dedicated to driving sustainable transformation through entrepreneurial excellence. Its multifaceted approach, encompassing research, education, data accessibility, and stakeholder engagement, ensures that it remains at the forefront of fostering innovation and economic growth through venture creation and entrepreneurship.

GAIL ABHA Program Snapshot

Program Site	GAIL PATA (Uttar Pradesh)	GAIL VIJAYPUR (Madhya Pradesh)
Registered Participants	300	100
No. of participants who successfully formed their own ventures	37	18
Total Number of Ventures	29	13



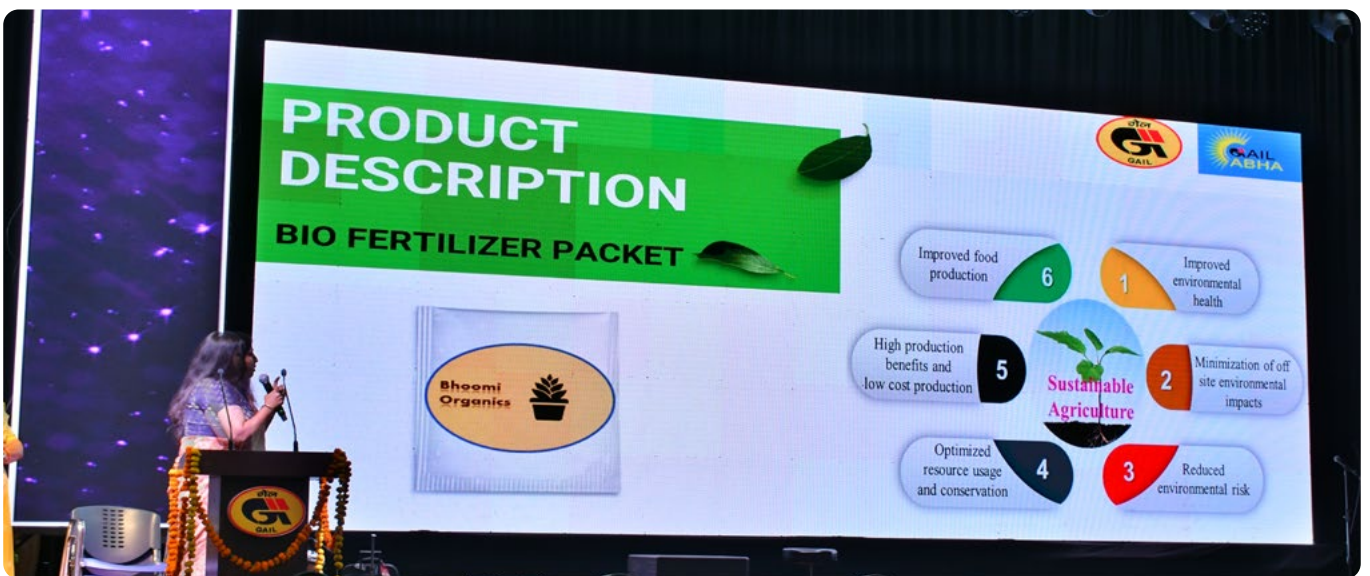
Shri. Ajay Tripathi, Executive Director and Officer-in-Charge, GAIL Pata presenting a token of appreciation to Prof. Thillai Rajan at the Start-up Showcase Workshop, recognizing the transformative impact of the initiative.



Jury members providing insightful feedback to GAIL ABHA participants at the Start-up Showcase Workshop, fostering growth and innovation.



From left to right: Prof. Thillai Rajan, Vignesh Raja (Mentor & Industry Expert), GAIL ABHA participants, and Sonali Jha (Mentor & Industry Expert) at the Start-up Showcase Workshop, embodying the spirit of collaboration and mentorship.



Participants presenting their start-up ideas with passion and creativity to the jury members and GAIL officials at the Start-up Showcase Workshop, turning dreams into reality.



Human Resource officials of GAIL and Team CREST, IIT Madras, along with the participants, posing for a group photo, symbolizing the collective journey of empowerment and entrepreneurship.



Enthusiastic GAIL ABHA participants actively engaging in a workshop held in May 2023 at Pata and Vijapur, reflecting the program's vibrant and supportive community.



Participants from Pata and Vijapur eagerly attending the Boot Camp workshops conducted by Team CREST, IIT Madras, in July 2023, dedicated to honing their entrepreneurial skills.



Highlights from the valedictory ceremony of GAIL ABHA held at Pata in April 2024. Shri Sandeep Kumar Gupta (Chairman and Managing Director, GAIL) and Shri Ayush Gupta (Director HR, GAIL) served as the chief guests, commending and awarding the start-ups for their outstanding efforts and contributions.



Highlights from the valedictory ceremony of GAIL ABHA held at Vijaipur in May 2024. Shri. Pankaj Jain (Secretary, Ministry of Petroleum and Natural Gas) graced the event as the chief guest, commending and awarding the start-ups for their outstanding efforts and contributions.

Start-up Junction - Live Chat Show Program on the National Television Network

From August to December 2022, Prof. Thillai Rajan hosted India's first live chat show on start-ups, "The Start-up Junction," on Doordarshan Tamil, part of the National Broadcasting Network. The program featured active participation from a plethora of seasoned entrepreneurs, who generously shared their wealth of experiences and invaluable insights with aspiring startups and individuals driven by entrepreneurial passion. These industry stalwarts offered firsthand accounts of their entrepreneurial journeys, highlighting key lessons learned, challenges overcome, and strategies for success in the dynamic startup ecosystem. Their willingness to impart knowledge and mentorship served as a guiding light for budding entrepreneurs, equipping them with the tools and inspiration needed to navigate the complexities of launching and scaling their ventures.

By fostering an environment of collaboration and knowledge exchange, the program empowered participants to embark on their entrepreneurial endeavours with confidence and clarity, laying the foundation for future innovation and growth.

The key elements of the program—economy, education, employment creation, entrepreneurship, and entertainment—reflect important focus areas for government policymaking today.

The youth of the country are actively engaged with start-ups as founders, employees, suppliers, or at least as consumers, indicating a significant opportunity to develop impactful programs on start-ups that engage the youth.

Each episode of "The Start-up Junction" centered on different topics related to start-ups, such as ideas for start-ups, the importance of business planning, team formation, and the path to profitability.

This approach captured the imagination of youngsters, as evidenced by the growing number of incubators and entrepreneurship cells in colleges today.

The weekly program featured a diverse lineup of guests, each bringing their unique expertise and entrepreneurial insights:

- Suresh Sambandam, CEO of Kissflow
- Suresh Kumar Gunasekaran, CEO of Pepul
- K. Pandiarajan, Chairman of Ma Foi
- C.K. Kumaravel, Naturals Salon & Spa
- Hemalatha Annamalai, Ampere Electric Vehicles
- Gomathy Shanmugam, AhaGuru
- Meena Ganesh, Portea Medical
- Arun Prakash M, GUVI Geek Networks
- Archana Stalin, myHarvest Farms
- Saravanan Balakrishnan, Amura.AI
- Ramky, Sports Mechanics
- Badri Seshadri, NHM
- L Kannan, Skillveri
- Mathangi Sampath, Timeless Beauty Secrets
- Sivasankara Prasad Thupalli, Jasmine Infotech
- Anil Srinivasan, Rhapsody Music Education
- Dr. Saundarya Rajesh, Chairperson and Founder of Avtar
- Siddharth, Spendflo
- Hari Ganapathy, Pick Your Trail
- Kavitha Sairam, Fibsol




Snapshot from an Episode of the Start-up Junction Television Program

K. Pandiarajan, Chairman of Ma Foi Management Services Limited and Former Minister of the Government of Tamil Nadu, and Hemalatha Pandiarajan discussing "Growth for Start-ups"



Scan here

To access the recorded versions of the Chat Show on Youtube

 Startup Junction

Executive Business Management Training Program for Tannery Entrepreneurs

The Executive Business Management Training Program for Tannery Entrepreneurs, a short-term initiative under the SIDBI MSME Cluster Intervention Program, was held from February 27 to March 3, 2023, targeting the Leather Footwear Cluster in Chennai. Despite having achieved revenues of ₹10-20 crores, members of the Pallavaram Tannery Cluster faced challenges in scaling their businesses further. They required fresh perspectives and modern business management frameworks to support their growth objectives.

In response to this need, KPMG, under a mandate from SIDBI, collaborated with the Pallavaram Tannery Cluster and

CREST, IIT Madras to conduct a workshop on domestic and export business management, marketing, and entrepreneurship. The 5-day program's curriculum was meticulously crafted to cover key functional areas such as marketing, international business, business expansion, costing, inventory management, administration, human resources, finance, operations, and organizational development. The primary audience for this program included first and second-generation entrepreneurs in the leather industry, particularly those running tanneries, with annual revenues ranging from ₹10 to 50 crores.



Capturing Moments from the Pre-Inaugural and Inaugural Events of the Executive Business Management Training Program for Tannery Entrepreneurs



Prof. Thenmozhi honouring the chief guest with a memento during the Inaugural function

From Left: Shri Mohamed Nazeeb, Managing Director, Pallavaram Tannery Industrial Effluent Treatment Company Ltd.; Shri Ravindran A L, General Manager of SIDBI; Dr. Thenmozhi M, Head, Department of Management Studies at IIT Madras; Prof. Thillai Rajan, Department of Management Studies, IIT Madras



Distinguished guests presenting certificate to a participant during the Valedictory function

From Left: Participant; Dr. Thenmozhi M., Head, Department of Management Studies, IIT Madras; Shri Subhransu Sekhar Acharya, Chief General Manager, SIDBI; Shri R. Selvam IAS, Executive Director of the Council of Leather Exports



Glimpses of the Valedictory Function of the Executive Business Management Training Program for Tannery Entrepreneurs

Events and Conferences

- Popular Lecture Series
- International Confluence Conference on Start-ups and Innovation 2023
- Webinar on The State of the Indian Private Capital Industry

“

Research is to see what everybody else has seen,
and to think what nobody else has thought

ALBERT SZENT-GYORGYI

Popular Lecture Series

Popular lecture series by faculty members and researchers

One of the objectives of CREST has been to create interfaces that facilitates interaction between academia, policy and practice. While members of the academic fraternity often present their research findings in academic conferences, members from policy and practice rarely participate in such conferences. Not many from the world of policy and practice read academic journals, the primary outlet of research for many faculty members and researchers. While there is strong interest from faculty members to disseminate their findings to the world of policy and practice, there is equal, if not more interest from the world of policy and practice to access and benefit from the latest research findings.

The popular lecture series is a platform of CREST that enables scholars and researchers to present their significant research findings in plain language to benefit policy makers and practitioners. While participation in the lecture series is open to all, CREST makes directed efforts to invite policy makers and practitioners to participate in these lectures and engage in a dialogue with scholars and benefit from the latest in research.


The popular lecture series is held online so that participants from across the world can join these sessions. Most of these lectures are available in the CREST YouTube channel. Scan the QR code given to access these lectures.

If you would like to be informed about these lectures, please send an email with your name, designation, organization, contact number and preferred email to crest@wmail.iitm.ac.in and we will be happy to add you to our mailing list.



Scan here

To access the recorded versions of
the lectures on Youtube

 @centreforresearchonstartup2482

Summary of the lectures that were held during 21-24 are given below.

CREST Inaugural Keynote Lecture

22 JUN, 2021

Tarun Khanna

Jorge Paulo Lemann Professor,
Harvard Business School



Topic: Cultivating Societal Trust: Unlocking India's Entrepreneurial Potential

Abstract: During the inaugural keynote lecture, Tarun Khanna emphasized that entrepreneurs with great ideas in developing countries cannot rely on the usual trust-building foundations. Assuming the existence of these phantom factors predisposes ventures to struggle at scale. This significant occasion also marked the official launch of the CREST website. Additionally, Professor Bhaskar Ramamurthi, Director of IIT Madras, delivered the Presidential Remarks, highlighting the strong international collaborative connections of these research initiatives.

He stated, “We are knitting together partnerships with leading groups across the world. We want to have a strong flow of people and ideas.”

30 SEP, 2021

Dr. Priyatej Murthy Kotipalli

Assistant Professor, Centre for Entrepreneurship and Innovation, Mahindra University



Topic: Entrepreneurial Competencies of Founders and Teams in the Indian Startup Ecosystem

Abstract: What are entrepreneurial competencies and how does it relate to the venture outcomes at the startup phase. The purpose of the current research is to explore this theme in the backdrop of the work of McClelland (1987). Further it will study the role of incubators in their ability to enhance these competencies, by creating the right entrepreneurial culture.

29 OCT, 2021

Dr. Suresh Bhagavatula

Professor, Entrepreneurship IIM Bangalore



Topic: Entrepreneurship in the handloom industry: The Master Weaver perspective

Abstract: The commercial handloom industry in India exists between a dispersed set of producers and consumers. It is primarily orchestrated through intermediaries, and these intermediaries play a crucial role in creating highly marketable products. The last handloom census in India showed that the industry employs over 3.2 crore people (NCAER, 2020), but 66 percent of these weavers are in North East India and weave mostly for domestic consumption due to the remoteness of the location. The rest, 34 percent (about a crore) of the weavers, are spread across the country and primarily support commercial production (ibid, pg 20). The census also finds that only 10 percent of these commercial weavers work for cooperatives, Khadi and Village Industries Commission (KVIC) and NGOs, whereas 66 percent work for master weavers (MW) and 24 percent are independent weavers, who sell directly to consumers. Master weaver is a generic term to refer to entrepreneurial market intermediaries who supply raw material and yarn to weavers, pay them wages and market the product. By taking a social network perspective within entrepreneurship along with industrial cluster literature, we generate insights into how

master weavers start and operate their ventures. This work would have implications for policy and support to the crafts industry.

30 NOV, 2021

Dr. Lakshmi Balachandra

Associate Professor, Entrepreneurship, Babson College



Topic: How unconscious biases drive investors interest?

Abstract: Investment decisions in early-stage ventures happen in an environment of high information asymmetry and uncertainty. As a result, the decision-making process, which many term it as opaque, involves a lot of subjective factors. Dr. Lakshmi Balachandra’s talk threw light on how in the absence of objective information, unconscious biases drive investors’ interest. A reality check on the venture capital funding decisions showed how the pitch influences investor decision-making based on trust, emotions, and most importantly, gender.

27 JAN, 2022

D. Sarasvathy

Professor, The Darden School of Business, University of Virginia



Topic: Building Successful Ventures: Effectual Principles for the Indian Start-ups

Abstract: Effectuation is an idea born of a unique look at an age-old problem – what makes entrepreneurs entrepreneurial? It is widely acclaimed as a rigorous framework for understanding the creation and growth of new organizations and markets. Effectuation research has found that there is a science to entrepreneurship and that great entrepreneurs across industries, geographies, and time use a common logic or thinking process to solve entrepreneurial problems. Prof. Sarasvathy’s talk focused on effectuation and building successful ventures.

23 FEB, 2022

Dr.Reddi Rayalu Kotha

Associate Professor, Lee Kong Chian
School of Business, Singapore
Management University



Topic: A Foot in the Door: Strategies for Investor Referrals

Abstract: Entrepreneurs hungry for capital should pay special attention to how they approach the investors. There is a strong evidence that investors pay more attention to those business plans that are referred by their trusted contacts. Therefore, a vital first-step for resource-starved entrepreneurs seeking funding for their scalable business-idea is to obtain referrals to early-stage investors. This talk elaborated on how thoughtful activation of existing contacts can enable even modestly-connected entrepreneurs to gain investor access

21 APR, 2022

Prof. S. Ramakrishna Velamuri

Professor and Dean of the School
of Management, Mahindra
University



Topic: The Role of Unit Economics: Balancing Value Creation and Value Capture

Abstract: Venture-backed early stage businesses focusing on growth often lose money; the question is whether the losses are healthy or not? If the business model anticipates creating and capturing value, the losses arising from the entrepreneurs' growth and scaling investments are considered healthy. However, if the business model is fundamentally flawed and fails to capture a part of the value it creates, then the scale will not convert the losses into profits. To generate revenue, absorbing losses year after year does not work for most entrepreneurs. However, a simple but often overlooked analysis of Unit Economics can help entrepreneurs determine whether they drive healthy or unhealthy losses. In his lecture, Prof. Ramakrishna discussed the importance of Unit Economics in ensuring the right balance between value creation and value capture in business models.

9 JUN, 2022

Prof. Balagopal Vissa

Professor of Entrepreneurship ,
INSEAD



Topic: Social Capital & Entrepreneurial Success

Abstract: Better connected entrepreneurs are more successful at spotting novel opportunities and mobilizing the resources needed to develop and execute on the opportunity. This talk outlined the implications to practitioners on how social capital of entrepreneurs' personal networks (in part) drives entrepreneurial success and what they can do to increase the social capital of their personal networks.

30 JUN, 2022

Prof. Josh Lerner

Jacob H. Schiff Professor of
Investment Banking, Harvard
Business School



Topic: The Venture Capital “Big Bang” and its Aftermath: Supernova or Black Hole?

Abstract: The Year 2021 saw an unprecedented explosion of venture capital activity worldwide, far eclipsing 2000 and earlier venture peaks. In that context, Prof. Josh Lerner discussed the following questions during this lecture: What was behind this dramatic surge of activity? How will it affect the nature of entrepreneurship and society more generally in the years to come? How should we interpret the sharp correction of 2022? What should venture and angel investors anticipate in the future? What does the contraction mean to entrepreneurs in emerging countries like India?

14 SEP, 2022

Prof. Suresh Cuganesan

Deputy Dean for Students and
External Partnerships, University of
Sydney Business School, Australia



Abstract: CREST organized a specialized interactive session specifically designed for our research scholars to engage directly with Professor Cuganesan. This session was incredibly valuable, providing our emerging scholars with the rare opportunity to gain insights from an experienced academic. During the session, participants were able to discuss their research, receive expert feedback, and explore

potential avenues for collaborative ventures. This initiative not only enhanced the academic development of our scholars but also opened doors for future research partnerships

23 MAR, 2023

Prof. Dr. Carolin Häussler

Chair of Organisation, Technology Management and Entrepreneurship, University of Passau



Topic: Promoting Novelty Creation in Ventures: The Impact of Owner Empowerment

Abstract: Ownership structure among co-founders is a critical decision that, if not executed well, can jeopardize the longevity of a startup. Members of New Venture Teams(NVT) take a decision on whether they will work together as equal partners (e.g., in a three-person team: 33:33:33) or if one NVT member is empowered by holding a higher ownership share (e.g., in a three-person team with a split of 40:30:30, the empowered owner-entrepreneur holds 40 percent). In this study, the influence of the ownership split in NVTs on some key performance metrics are studied using a sample of 5,114 inventive projects. The results of the study suggest that novelty was higher for NVTs with owner empowerment. Novelty was also higher when a member of an NVT with owner empowerment participates directly in the inventive project.

12 DEC 2023

Prof. Jon Thomas

The Esposito Family Centre for Innovation & Entrepreneurship University of Fraser Valley, Canada



Topic: Strategies for Publishing Longitudinal, Multi-level, Process-Based Qualitative Research

This workshop was organized specifically for innovation and technology management researchers and scholars interested in publishing qualitative research studies in leading academic journals. The workshop aimed to help participants reflect on qualitative research design within the field, develop a stronger understanding of how to effectively communicate the robustness of their qualitative research methods, and briefly explore strategies for publishing their work in top innovation and technology management journals.

18 JAN, 2024

Dr. Krithika Randhawa

Associate Professor, Discipline of Strategy, Innovation and Entrepreneurship, The University of Sydney Business School, THE UNIVERSITY OF SYDNEY




Topic: Publishing in Top-Tier Management Journals

Abstract: During her talk, Prof. Krithika provided prospective authors from various disciplines insight into the aims of journals like the Journal of Product Innovation Management, Journal of Business Research, and R&D Management. The presentation also focused on the break down the formulation and packaging of a research project into a publication for Ph.D. researchers, addressing aspects like conceptual novelty, research questions, design robustness, and topical importance.



Scan here

To access the recorded versions of the lectures on Youtube

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International Confluence Conference on Start-ups and Innovation (ICCSI 2023)

13-15 DEC, 2023

“

One good conversation can shift the direction of the change forever.

LINDA LAM

A forum that brings together academics, policymakers, and industry experts to exchange insights and have conversation is exceedingly rare. The International Confluence Conference on Start-ups and Innovation (ICCSI) was conceived with the explicit aim of providing such an opportunity, by bringing the triumvirate of researchers, policy makers and practitioners to have conversations and discuss their experiences and findings. For research to break new ground such interactions between policy makers and practitioners is important. More so, in the areas of entrepreneurship, start-ups and innovation. While the twain may never meet, the conflict that emerges from the juxtaposition of research with policy and practice leads to advancement of knowledge.

The ICCSI Conference brought together Business and Management faculty, researchers, Ph.D. scholars, national and state government policymakers, entrepreneurs, venture investors including angels and VCs, as well as ecosystem enablers like incubators, accelerators, and mentors. Students and research scholars had the opportunity to interact with

accomplished members of academia, government, and industry who attended the conference. A unique aspect of the conference was the policy and practitioner track that ran alongside the academic track, facilitating the convergence of all stakeholders in the startup ecosystem.

The ICCSI Conference was jointly organized with the support of partner institutes: BIMTECH, BML Munjal University, MS Ramaiah University, PSG Institute of Management, and University of the Fraser Valley

The conference received over 100 submissions for presentation from national and international research scholars. In a unique feature, the conference included more than 15 invited presentations from practitioners across various established industries.

It featured over 8 master sessions and 5 professional development workshops conducted by faculty from leading business schools and universities. The conference hosted over 15 plenary talks by prominent industry experts, government officials, and speakers from the world of politics.



The Confluence Conference was inaugurated by Shri. Sivasubramanian Ramann, Chairman and Managing Director of Small Industries Development Bank of India (SIDBI). This was followed by a presidential address delivered by Prof. Kamakoti, Director of IIT Madras, and special address by Shri. Gopal Srinivasan of TVS Capital, and Prof. Thenmozhi, Head of the Department of Management Studies, IIT Madras. During the inauguration, Shri. Sivasubramanian Ramann also launched the “Indian Startup Ecosystem and Investor Platform.”



Prof. Rishikesha T. Krishnan, Director and Professor of Strategy, and Ram Charan Chair Professor in Innovation and Leadership at IIM Bangalore delivered a plenary talk on “Startups as a Driver of Indian Technological Leadership: Policy & Firm Strategy Implications.” This was followed by a fireside chat with Kris Gopalakrishnan, Co-founder of Infosys.



Prof. Ashok Jhunjhunwala, President of IIT Madras Research Park and Institute Professor at IIT Madras, delivered a plenary talk on “What Makes Deep Tech Startups Successful.”



Prof. Srivardhini K. Jha, Associate Professor of Entrepreneurship and Chairperson, NSRCEL, Indian Institute of Management Bangalore, presented on “Digitalization.”



Prof. Subash, Professor, Department of Humanities and Social Sciences, IIT Madras, delivered his presentation on “Gender inequality and Innovation”



Prof. Rupashree Baral, Professor (HR & OB), Advisor - Diversity, Equity, and Inclusion (DEI), Department of Management Studies, IIT Madras, presented on “Women’s Entrepreneurship in India”



Prof. Jon Thomas, Director, EFCIE, Associate Professor, Innovation & Entrepreneurship, School of Business, University of Fraser Valley, Canada, delivered his presentation on “Innovation ecosystem”



Prof. Ruchi Sharma, Professor, School of Humanities and Social Sciences, IIT Indore, delivered her talk on “Non-working Patents in Indian Start-ups”



Prof. Ambuj Gupta, Area Chair Finance, Dean - National Relations and Tie-ups, Kirloskar Institute of Management Pune, presented on “Reorienting Business Models”



The theme plenary session on “Digital Innovations and Sustainability: A Collaborative Approach to Success,” featuring Sruthi Kannan, Head of Cisco for Start-ups; T.M. Mallesh, CEO and Founder of Cultivate; Sharath Loganathan, Co-founder of Ninjacart; and S. Shriram, Director of Fluxgen Technologies. The session was chaired by Prof. Srivardhini K. Jha from IIM Bangalore.



Professional Development Workshop on “Crafting Papers for Publication in Top Entrepreneurship Journals” was conducted by Prof. Raj Krishnan Shankar from the Great Lakes Institute of Management.



Professional Development Workshop, titled “Generative AI and Large Language Models,” was conducted by Prof. V. N. Rajesh from the IFMR-Krea Graduate School of Business, Krea University.



Narayan Ramachandran, Chairman of Team Lease, delivered a talk on “Will Ideas Follow the Money Trail or the Other Way Around?” at the Conference Banquet and Dinner Plenary.



Prof. Rajan Varadarajan from Mays Business School at Texas A&M University, delivered a plenary on “Innovations for the Greater Good: Economically Viable, Environmentally Sustainable, and Socially Impactful Innovations.”



Ashish Agarwal, Head - Gig Banking, Startups at HDFC Bank, delivered a talk on “The Role of Banks in the Start-up Journey.”



Sushant Shetty, Vice President at DBS Bank, delivered a plenary talk on “How Banks Can Create Value for Start-ups: Essential Insights for Start-up Founders.”



Raju Goteti, Vice President at TCS, delivered a plenary talk titled “Industry-Academia Collaboration to Promote Entrepreneurship: The Case of TCS Co-Innovation Network (COIN).”



Prof. Sonali Gupta, Director, Centre for Entrepreneurship, M. S. Ramaiah University of Applied Sciences, presented on “Business incubation support”



The Professional Development Workshop titled “Exploring Novel Avenues for Research in Business Incubation” was conducted by Prof. Sonali Gupta, Director of the Center for Entrepreneurship at Ramaiah University of Applied Sciences.



Prof. V. Ramgopal Rao, the Vice Chancellor of BITS Pilani, delivered a plenary on “Aligning Research and Innovation in Indian Institutions: A Vision for a Self-Reliant India.”



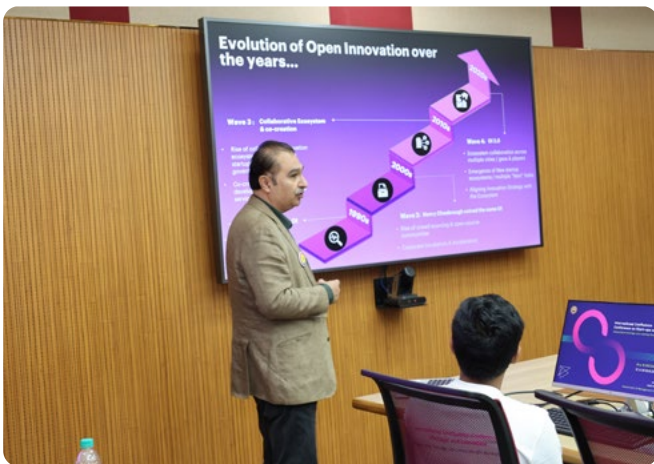
Prof. Saras D. Sarasvathi, Paul M. Hamaker Professor of Business Administration at the Darden Business School, University of Virginia, virtually delivered a plenary talk on “Action Under Uncertainty: Lessons from Expert Entrepreneurs.”



Entrepreneurship Ecosystem Studio comprised an insightful session where all conference partners and entrepreneurship experts shared their valuable insights.



Prof. Sujatha Srinivasan and Prof. Satya R. Chakravarthy from IIT Madras delivered a Plenary talk on “Commercializing Science.”



Avnish Sabharwal, Managing Director at Accenture Ventures delivered a Plenary titled “Startups, Corporates, Academia – the Open Innovation Trinity.”



Prof. Mahesh Joshi from George Mason University delivered a talk on “Understanding and Promoting Corporate Entrepreneurship.”



Dr. Archana Hingorani, Managing Director at Siana Capital, delivered a plenary on “Funding Deep Tech.”



The conference plenary session on “The Political Narrative on Start-ups: Diverse Perspectives” featured prominent figures from various political parties across the country.



K. Annamalai, President of the Tamil Nadu BJP State Unit, shared the party’s vision and expectations for the startup ecosystem, emphasizing the critical role of entrepreneurship in driving economic growth and development.



Ghanshyam Tiwari, the National Spokesperson of the Samajwadi Party, shared his party’s perspectives on the startup ecosystem, emphasizing the importance and pivotal role startups play in economic development.



C.K. Kumaravel, Entrepreneur and Head of the Congress Professionals Chennai Chapter, represented his party and shared their perspectives on the significance of startups in India.



Dr. PTR Palanivel Thiagarajan, the Honorable Minister of Information Technology and Digital Services of Tamil Nadu, delivered a talk on “Startups and Innovation.”



Neha Jaswal, Research Scholar at IIT Mandi, was honored with the Best Paper Award. Presenting the award were Dr. PTR Palanivel Thiagarajan, Dr. Mahesh V. Panchagnula, Dean of Alumni and Corporate Relations at the Indian Institute of Technology Madras, Prof. Sankalp Pratap from the Desai Sethi School of Entrepreneurship at IIT Bombay, and Ranjeet Santhakumar, Managing Director and Head of Investment Banking Technology and Operations at Societe Generale.



Dr. Deepak Pandit from BML Munjal University, School of Business was honored with the Best Paper Award. Presenting the award were Dr. PTR Palanivel Thiagarajan, Dr. Mahesh V. Panchagnula, Dean of Alumni and Corporate Relations at the Indian Institute of Technology Madras, Prof. Sankalp Pratap from the Desai Sethi School of Entrepreneurship at IIT Bombay, and Ranjeet Santhakumar, Managing Director and Head of Investment Banking Technology and Operations at Societe Generale.



Prof. Sonali Gupta, Director of the Center for Entrepreneurship at Ramaiah University of Applied Sciences, was honored with the Best Paper Award. Presenting the award were Dr. PTR Palanivel Thiagarajan, Dr. Mahesh V. Panchagnula, Dean of Alumni and Corporate Relations at the Indian Institute of Technology Madras, Prof. Sankalp Pratap from the Desai Sethi School of Entrepreneurship at IIT Bombay, and Ranjeet Santhakumar, Managing Director and Head of Investment Banking Technology and Operations at Societe Generale.



Madhavan V Nampoothiri, Research Scholar at IIT Madras, was honored with the Best Paper Award. Presenting the award were Dr. PTR Palanivel Thiagarajan, Dr. Mahesh V. Panchagnula, Dean of Alumni and Corporate Relations at the Indian Institute of Technology Madras, Prof. Sankalp Pratap from the Desai Sethi School of Entrepreneurship at IIT Bombay, and Ranjeet Santhakumar, Managing Director and Head of Investment Banking Technology and Operations at Societe Generale.

Webinar on The State of the Indian Private Capital Industry - jointly organized with The Private Capital Research Institute and Harvard Business School

14 DEC, 2022



**Harvard
Business
School**



The Centre for Research on Start-Ups and Risk Financing (CREST), the Private Capital Project of Harvard Business School, and the Private Capital Research Institute jointly organized a webinar titled “The State of the Indian Private Capital Industry” on December 14, 2022

Speakers



Karthik Reddy
Managing Partner, Blume Ventures



Prakul Kaushiva
Managing Director, CPP Investments



Rajan Anandan
Managing Director, Sequoia Capital



Renuka Ramnath
Managing Director and CEO,
Multiples Alternate Asset Management

Moderators



Josh Lerner
Jacob H. Schiff Professor of Investment
Banking, Harvard Business School



Thillai Rajan A.
Professor, Department of Management
Studies, Indian Institute of Technology
Madras

The Indian private equity industry has been the subject of intense interest in recent years. According to Bain & Company, Indian private equity and venture capital investments reached almost \$70 billion in 2021, up from \$17 billion five years before. Despite the global slowdown, the environment in India is well positioned for significant

growth with a surge in investor confidence, a talented pool of entrepreneurs, favorable economic conditions, and an established infrastructure with consumer technology, fintech, and software industries leading the way. This discussion explored the extraordinary surge of Indian private capital activity and the challenges and prospects in the years ahead.

As one of the largest and fastest-growing economies globally, India is attracting global pools of sophisticated money. Figure 1 shows the tremendous growth of total private equity and venture capital investment dollars and the recent increase in the total number of transactions.

This growth had several sources. The Covid-19 pandemic accelerated the digitization of India and brought new business models and value creation. In addition, changes in the listing regulation led to multibillion-dollar companies going public. And returns have been attractive: for instance, the performance of recent Indian venture capital funds has been on par with U.S. VC funds in terms of total value to paid in (“TVPI”), 2.14 vs. 2.16, respectively.^[1] The speed of the growth in Indian private markets was led by a handful of family offices that were able to move more quickly than large domestic financial institutions.

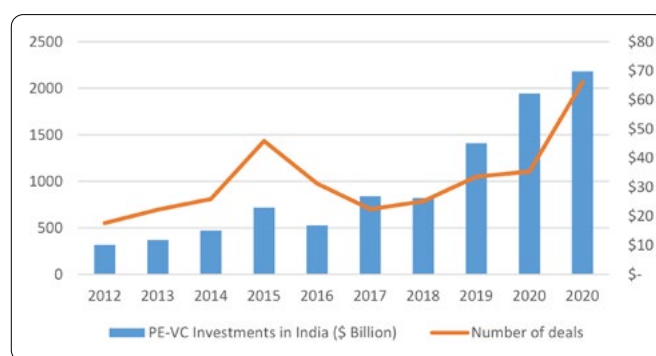


Figure 1: Annual PE-VC Investments in India (Adapted from Figure 6 in the Bain Capital India Private Equity Report 2022.)



Scan here

To read complete synopsis of webinar

The State of the Indian Private Capital Industry

^[1] State Street Global Private Equity Database, as of December 13, 2022. Performance of venture capital funds, vintage years 2005-2022.



PART D

Impact and Outcomes

“

At the end of the day, your job is to minimize output,
and maximize outcome and impact.

JEFF PATTON

Publications

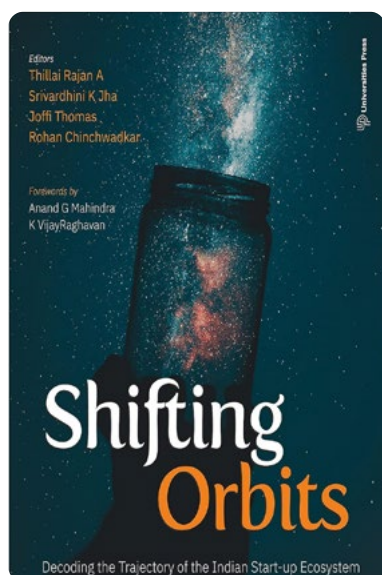
- Books
- Journal Papers



It always seems impossible until its' done

NELSON MANDELA

Books



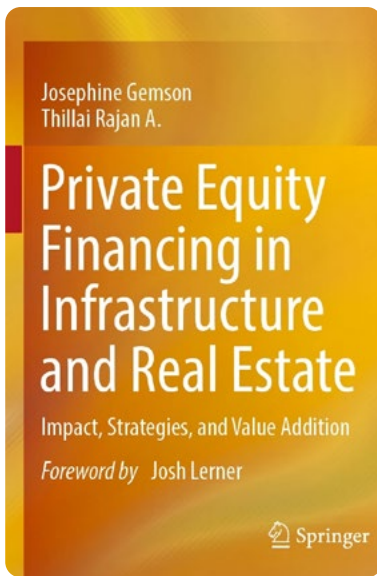
ISBN: 978-93-89211-95-5

Shifting Orbits: Decoding the Trajectory of the Indian Start-up Ecosystem

Thillai Rajan A., Co-Edited with Srivardhini K. Jha, Joffi Thomas, and Rohan Chinchwadkar



In the new millennium, the shape of India's vibrant entrepreneurial economy has changed significantly to move towards one driven by technology and innovation. Today, India is one of the largest start-up and innovation hubs in the world, and the Indian start-up ecosystem has become an important contributor in our journey to become a \$5 trillion economy. *Shifting Orbits* chronicles the spectacular rise of the start-up landscape in India in four different sections: innovation, incubation, funding and industry perspectives. • The first section dives deeper into understanding how India is faring on innovation-led entrepreneurship and delineates the challenges to be overcome. • The next section explains how incubators provide a safe harbour for start-ups so that they can survive and flourish as viable businesses. • For start-ups to be able to grow and create an impact, funding is critical – the third section examines the current funding scenario and lists the policy changes essential for its growth. • The section on industry perspectives takes an analytical, practice-centred view of the growth of the Indian innovation ecosystem. Taken together, *Shifting Orbits* is a comprehensive narrative on innovation and venturing in India and provides valuable insights on current trends and practices as well as the challenges and potential benefits for the future.



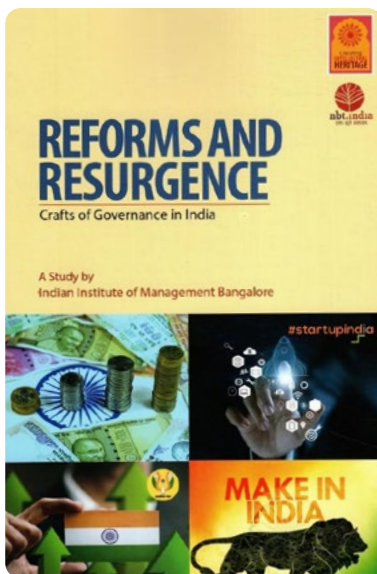
ISBN: 978-981-16-1633-4

Private Equity Financing in Infrastructure and Real Estate: Impact, Strategies, and Value Addition

Josephine Gemson and Thillai Rajan A



This book provides a comprehensive overview of Private Equity (PE) financing in the infrastructure and real estate sectors. In doing so, it analyzes the impact of such investments in the two sectors, evaluates the types of financing strategies, and explores the value created by such investments. Infrastructure and Real Estate have emerged as a significant asset class for PE investors. In the last three decades, PE firms have invested significant amounts of capital in infrastructure and real estate – sectors which did not feature in their radar before 2000. Between 2000 and 2009, PE firms invested more than USD 200 billion in infrastructure. Real estate sector also witnessed investments of a similar scale as that of infrastructure. Fundraising for infrastructure and real estate was about USD 100 billion and USD 150 billion respectively in 2019, setting new records and reaching all-time highs. This book examines such PE investments – both at a global level and at an emerging economy level, to identify how PE firms have created an impact with their investments, to provide both ready capital and value-addition to sectors which seem to urgently need both.



Reforms and Resurgence: Crafts of Governance in India

Startup India

Thillai Rajan A., Sathya Anbajagane and Reeba Devaraj



The Government of India has undertaken a large number of path-breaking initiatives in the last nine years considering the welfare of people at the last mile, which have yielded substantial social and economic impact. The government has now identified various development schemes from the large database related to these initiatives for analysis and intends to publish the material for the furtherance of knowledge in these areas. As part of this endeavour, the Indian Institute of Management Bangalore has worked with the Ministry of Education on a project, 'Creating Intellectual Heritage: A Dialogue, Documentation and Research Programme'. Working on a cluster theme, 'Reforms and Resurgence: Crafts of Governance in India', few excellent academicians have evaluated some important socio-economic initiatives and achievements of the government in different sectors and presented them as articles under five different sub-themes, which are listed in the contents of this publication. This study would be helpful to administrators, policymakers, researchers, and academicians, who are keenly involved in the developmental progress of our nation.



ISBN: 978-1-80220-185-7

Research Handbook on Information Systems and the Environment

Vanessa A. Cooper, Johann J. Kranz, Saji K. Mathew, Richard T. Watson



This comprehensive Research Handbook provides international perspectives on the role of information systems in environmental sustainability, drawing on ground-breaking research from leading scholars to predict future trends. Presenting in-depth studies which utilise a diverse range of research approaches and methods, this insightful Handbook provides a thorough examination of information systems research on environmental sustainability.

9. Green IS: an imperative and an opportunity for IT services

Saji K. Mathew and Thillai Rajan

1. INTRODUCTION

Amidst the rising concerns over a future climate disaster, development without adverse effects on the environment remains a global challenge (Gates, 2021). As the quality of life and productivity of human beings are a function of access to modern technologies, the production and consumption of the latter must go green to affect the former. Sustainable development is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland et al., 1987, para. 1). Corporate policies play a critical role towards such sustainable development. However, building a culture of sustainability appears to be in conflict with the primary motive of corporations, which is to generate shareholder wealth. This is because switching to sustainable practices would require corporations to pay a green premium (Gates, 2021). On the other hand, environmental, social and governance (ESG) responsibility has become a priority today for several corporations (*Economic Times*, 2021). What is driving this corporate concern for the environment? In particular, do for-profit business entities construe environmental responsibility as a cost to comply with, or as an opportunity to create new business or as an imperative for business sustainability? This chapter addresses these questions with a special focus on India’s IT services industry.

Sustainable development seeks to bring a balance between a country’s economic development and the environment. India ranks third in the world in greenhouse gas (GHG) emissions, after China and the US. However, the per capita GHG emissions are comparatively lower due to the large population of the country. According to some estimates the environmental impact of economic development in India has contributed to losses of US\$79.5 billion from extreme climate events and \$100 billion due to vector-borne diseases in the last two decades (Shah, 2021). The gross domestic product (GDP) of India grew from \$468.4 billion in 2000 to \$2.87 trillion in 2019 (World Bank, 2021). These figures reflect how the growth aspirations of a country could invite damage to its environment, unless moderated by considered sustainable development policies and practices.

India’s IT sector has made significant contributions to the country’s economic development. The sector grew from \$1 billion in 2000 to \$194 billion in 2021 (NASSCOM, 2021). With legally binding global frameworks like the Kyoto Protocol, the industry became increasingly aware of the need to comply with emission standards (Misra & Srivastava, 2012). The IT sector, which employs about 4.5 million people (Statistica, 2020) also loses \$1.3 billion due to pollution-induced productivity losses every year (Shah, 2021). Although the rationale for compliance with environmental regulations is obvious in this context, information systems (IS) research on the role of IT industry for environmental sustainability is quite limited.



IIMB Management Review

The future of incubation

Srivardhini K. Jha, Thillai Rajan A.



IIMB Management Review (2024) 36, 48-55



available at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/iimb



IIMB Golden Jubilee Special Feature
ROUND TABLE

The future of incubation

Srivardhini K. Jha^{a,*}, Thillai Rajan A.^b

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^b Indian Institute of Technology Madras, Chennai, Tamil Nadu, India

Received 7 December 2023; revised form 4 March 2024; accepted 12 March 2024; Available online 15 March 2024

KEYWORDS

Entrepreneurship;
Incubation;
India;
Startup ecosystem

Abstract Incubators play an instrumental role in nurturing startups and creating a vibrant ecosystem. But as the ecosystem evolves, incubators also need to reinvent themselves to stay relevant. Against a burgeoning startup ecosystem in India, this roundtable deliberates on the future of incubation. The experts discuss what services incubators should offer, how they should measure their impact and how they can become financially sustainable.

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Academic perspective

Introduction

Incubators are organisations that support the establishment and growth of startups by providing them with tangible and intangible resources (Hausberg & Korreck, 2020). Incubators are an integral part of startup ecosystems around the world and have been accepted as an important and effective intermediary that promote and nurture new ventures (Bruneel, Ratinho, Clarysse, & Groen, 2012; Tsai, Hsieh, Fang, & Lin, 2009). They act as an interface between the broader business ecosystem and startups, providing an array of support and services such as technology, capital and know-how (Grimaldi & Grandi, 2005) that help ventures overcome their liabilities of newness and achieve growth. Thus, incubators

contribute to business growth, and consequently, to regional development and economic growth (Tsai et al., 2009).

There is a great deal of heterogeneity among incubators (Barbero, Casillas, Wright, & Garcia, 2014; Bergek & Norman, 2008; Grimaldi & Grandi, 2005). Incubators can be classified into three broad types depending on their strategic objective and the bouquet of services they offer to startups (Pauwels, Clarysse, Wright, & Van Hove, 2016). First are business innovation centers, whose objective is to promote regional economic development. They are open to startups from all sectors, provide generic business support services, and aim to support a large number of startups from a region (Barbero et al., 2014). A second type is university incubators that are focused on commercialising technology and innovation developed in their laboratories. They focus on supporting a small number of technology startups that originate from their labs to commercialise the scientific and technological knowledge from the universities (Pauwels et al., 2016). A third type of incubator are private incubators that might be either independently operated or under the

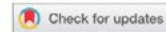
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<https://doi.org/10.1016/j.iimb.2024.03.003>

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Strategic response to Industry 4.0 – an empirical analysis from a developing country perspective

Pinosh Kumar Hajoary

TECHNOLOGY ANALYSIS & STRATEGIC MANAGEMENT
<https://doi.org/10.1080/09537325.2023.2242520> **Routledge**
Taylor & Francis Group**Strategic response to Industry 4.0 – an empirical analysis from a developing country perspective**

Pinosh Kumar Hajoary

Department of Management Studies, IIT Madras, Chennai, India

ABSTRACT

The advent of Industry 4.0 technologies has triggered a transformation in the manufacturing sector worldwide. As such, it has become crucial to identify the critical success factors that impact the adoption of advanced production technologies as part of the Industry 4.0 strategy. This study has employed the Technology, Organization, Environment framework to analyse the influencing factors of the steel manufacturing sector in a developing country. The results indicate that organisational readiness, external pressure and government policies do not influence significantly, whereas IT maturity, technological incentives, perceived benefits, top management support and employee capability have a significant influence on the use of advanced production technologies. In light of these results, this study not only contributes to the advancement of Industry 4.0 theory but also provides valuable guidance for managers, policymakers and practitioners on implementing advanced production technologies.

ARTICLE HISTORY

Received 29 August 2022
Revised 27 June 2023
Accepted 24 July 2023

KEYWORDS

Industry 4.0; advanced production technologies; strategic response; TOE

1. Introduction

The manufacturing sector is a crucial part of most countries' economies and has historically played a significant role in their growth and development, encompassing diverse industries such as textiles, chemicals, automotive, electronics, steel and cement (Hajoary 2021). Currently, the sector is undergoing a significant transformation with the emergence of Industry 4.0 (I4.0) technologies to improve processes, productivity, fuel growth and stay competitive in the market. I4.0 has offered huge opportunities for manufacturing organisations to integrate, digitalise and automate systems and processes to achieve higher energy efficiency, innovation, competitiveness and productivity (Xu et al. 2018). Furthermore, advanced production technologies, such as the Internet of Things (IoT), cyber-physical systems, cloud computing, additive manufacturing, big data, artificial intelligence, advanced robotics and simulation technologies are merging the physical world with the virtual space (Hermann, Pentek, and Otto 2016; Lasi et al. 2014). These advanced technologies are automating production systems and processes and changing how we work and live. Additionally, I4.0 has facilitated business model innovation and circular economy in various sectors (Frank et al. 2019; Ranta, Aarikka-Stenroos, and Väisänen 2021).

In this era, emerging countries like India face challenges such as, infrastructure, skilled labour, access to finance, outdated technology, economies of scale and competitive advantage in their products and services. However, in recent years the government of India has made several efforts with 'Make in India', 'Digital India', 'Startup India' and 'Invest India' initiatives to create a more conducive environment for the manufacturing sector in India. For instance, India became the second-largest

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Industry 4.0 maturity assessment: a multi dimensional indicator approach

Pinosh Kumar Hajoary, Amrita MA, Jose Arturo Garza-Reyes



Industry 4.0 maturity assessment: a multi-dimensional indicator approach

Industry 4.0
maturity
assessment

Pinosh Kumar Hajoary

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Chennai, India*

Amrita MA

The University of People, Pasadena, California, USA, and

Jose Arturo Garza-Reyes

*Centre for Supply Chain Improvement, The University of Derby, Derby, UK and
Department of Management Studies, Graphic Era Deemed to be University,
Dehradun, India*

Received 17 August 2022
Revised 30 January 2023
6 April 2023
Accepted 12 April 2023

Abstract

Purpose – Industry 4.0 has offered significant potential for manufacturing firms to alter and rethink their business models, production processes, strategies and objectives. Manufacturing organizations have recently undergone substantial transformation due to Industry 4.0 technologies. Hence, to successfully deploy and embed Industry 4.0 technologies in their organizational operations and practices, businesses must assess their adoption readiness. For this purpose, a multi-dimensional analytical indicator methodology has been developed to measure Industry 4.0 maturity and preparedness.

Design/methodology/approach – A weighted average method was adopted to assess the Industry 4.0 readiness using a case study from a steel manufacturing organization.

Findings – The result revealed that the firm ranks between Industry 2.0 and Industry 3.0, with an overall score of 2.32. This means that the organization is yet to achieve Industry 4.0 mature and ready organization.

Practical implications – The multi-dimensional indicator framework proposed can be used by managers, policymakers, practitioners and researchers to assess the current status of organizations in terms of Industry 4.0 maturity and readiness as well as undertake a practical diagnosis and prognosis of systems and processes for its future adoption.

Originality/value – Although research on Industry 4.0 maturity models has grown exponentially in recent years, this study is the first to develop a multi-dimensional analytical indicator to measure Industry 4.0 maturity and readiness.

Keywords Industry 4.0, Maturity, Readiness, Assessment, Indicators, Multi-dimensional

Paper type Research paper

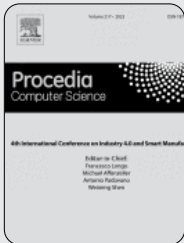
1. Introduction

Industry 4.0 (I4.0) has offered significant potential for manufacturing firms to alter and rethink their business models, production processes, strategies and objectives (Crnjac *et al.*, 2017; Pirola *et al.*, 2019; Himang *et al.*, 2020). Scholars, industry leaders and practitioners believe that I4.0 will stay long and is yet to reach its true potential (Liao *et al.*, 2017). The I4.0 era is inevitable, and all economies must seize the chance since it will have an impact on every organization in the future (Mehra *et al.*, 2017; Flores *et al.*, 2020). Therefore, this revolution is equally important for developed and developing economies like India (Mehra *et al.*, 2017).

Recently, manufacturing organizations have started adopting emerging technologies like the Internet of things, cloud computing, 3D printing, advanced robotics, among others, to streamline and improve their production processes, quality and reduce production costs (Luthra *et al.*, 2020; Wagire *et al.*, 2020). For the effective adoption of I4.0 technologies, manufacturing organizations must measure and assess their current status and



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Procedia Computer Science

Industry 4.0 Maturity and Readiness- A case of a Steel Manufacturing Organization

Pinosh Kumar Hajoary



Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 217 (2023) 614–619

Procedia
Computer Science

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4th International Conference on Industry 4.0 and Smart Manufacturing

Industry 4.0 Maturity and Readiness- A case of a Steel Manufacturing Organization

Pinosh Kumar Hajoary^{a*}

^{a*}DoMS, IIT Madras, Madras, Tamil Nadu, 600036, India

Abstract

Industry 4.0(I4.0) is changing the manufacturing ecosystem of the world with the integration of digital technologies in the way companies manufacture, improve, and distribute their products. However, most manufacturing companies often fail to integrate these technologies within their organizational departments due to a lack of Industry 4.0 readiness assessment of the existing systems, processes, and practices. On the other hand, using Industry 4.0 readiness measures, it is possible to assess the current status of the organization to enable them to integrate and help them transition towards an Industry 4.0 mature and ready organization. Hence, this study presents a case analysis of major departments of a large integrated steel manufacturing company and identifies gaps and provides recommendations to reach towards Industry 4.0.

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Peer-review under responsibility of the scientific committee of the 4th International Conference on Industry 4.0 and Smart Manufacturing

Keywords: Industry 4.0; Maturity and Readiness; Assessment; Steel manufacturing

1. Introduction

Technological advancements have changed the manufacturing industry over the years. It has changed the way products are produced and distributed to consumers. It has also improved the efficiency and productivity of industrial manufacturing systems and processes.

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Guest editorial

Guest editorial

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Since the time the Prime Minister of India, Narendra Modi, coined the popular “Start-up India, Stand-up India” slogan in his Independence Day address on 15 August 2015 (Business Standard, 2015), there has been a significant policy impetus to encourage start-ups and develop a supportive ecosystem for start-ups and innovation in India. The supportive stance of the national government has also influenced the various state governments to enact similar policies. The accommodative policy environment along with a convergence of various factors has resulted in India emerging as the World’s third-largest start-up ecosystem (InvestIndia, 2022). Underlining this was the declaration made by the Prime Minister of India to mark 16 January as the National Start-up Day to percolate the start-up culture at the grassroots level (The Hindu, 2022). A recent publication (Thillai Rajan *et al.*, 2021) provides a comprehensive overview of the evolution of the Indian start-up ecosystem.

In tandem, the rapid growth in the number of start-ups and investment flow has garnered the interest of research scholars and academia. From setting up purely action and implementation-oriented centres such as incubators and innovation labs, the Indian universities have also started to focus on academic research and knowledge creation in the areas of start-ups and venture capital. The Centre for Research on Start-ups and Risk Financing (CREST) set up at the Indian Institute of Technology Madras is an example. The growing interest on academic research in this area has also led to the formation of a Pan India academic consortium, namely, the innovation, venturing and entrepreneurship in India network (iVEIN). This special issue on “Start-ups, Innovation and Venturing” is, therefore, not only relevant but also timely.

The special issue consists of four papers, encompassing different, but very pertinent topics to the Indian start-up ecosystem. Most start-ups need external capital, and more often than not, early source of funding is provided by angel investors. The first paper by Niroopa Rani Annamalaisami focuses on the differences between angel investors who invest in pre-seed and seed-stage funding rounds. Based on an analysis of 732 angel investments made by 405 investors during 2014–2018, the author finds that angels with more industry-specific experience made a higher proportion of investment in seed-stage ventures. Seed-stage ventures attracted investors from larger cities, whereas the pre-seed stage had higher investors from smaller cities. Though the investment size was smaller, the extent of syndication was greater in pre-seed stage investments.

The second paper by Navaneetha Krishnan, Ganesh and Rajendran focuses on start-up success. It is well known that mortality rates of start-ups are high. Increasing the success rates of start-ups, therefore, has been a topic of interest for both researchers and practitioners. Based on a survey of 51 specialists, the authors analyse various failures that start-ups in India were exposed to and propose interventions based on management accounting tools (MAT) to address these risks. The authors also go on to conclude that failures of start-ups can be addressed by implementing a combination of MAT. Furthermore, the most effective combination of MAT for a start-up was contingent upon various factors such as the firm’s size, culture, leadership style, the operating sector, funding stage, valuation and preferred growth model.

The third paper by James Dominic and Arun Kumar Gopalswamy focuses on a subject that has immense practical importance, namely, venture exits and returns. The authors analyse the various factors that affect venture exits and returns, such as investment



In Social Media

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Don't use social media to impress people;
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.@IITMadras has announced the launch of CREST (Centre for Research on StartUps and Risk Financing), a research centre to provide academic and thought leadership in innovation, entrepreneurship, and risk capital.

bit.ly/IITM-CREST



8:50 PM · Jun 30, 2021



Amitabh Kant ✓

@amitabhk87



Had the pleasure of launching book "Shifting Orbits: Decoding the Trajectory of the Indian Start-up Ecosystem". Congrats to brilliant team - Prof. Joffi Thomas, Prof. Srivardhini K Jha, Prof. Rohan Chinchwadkar & Prof. Thillai Rajan. Finest book on the Indian startup ecosystem.



7:36 PM · Jul 23, 2021



Rajeev Chandrasekhar 🇮🇳 
@Rajeev_Gol

Today, we have a vast, deep, and diversified startup innovation ecosystem in the country.

Congratulations to @iitmadras for the launch of the 'ynos' - Investor Information and Analytics Platform, which will act as a one-stop shop for #startups, VCs, investors, policymakers,... [Show more](#)



9:24 PM · Feb 26, 2024



Digital India 
@_DigitalIndia

The Investor Information and Analytics Platform, ynos, developed by @IITMadras will act as a one-stop shop for startups to seamlessly access Venture Capitalists (VCs) and investors networks, Govt schemes and several other components of the startup landscape for all stakeholders.... [Show more](#)



10:40 AM · Mar 4, 2024

In Popular Media

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Perfection is not attainable, but if we chase perfection we can catch excellence.

VINCE LOMBARDI

The Hindu

February 25, 2022

Is the new economy creating new jobs?

PARLEY

Startups can create high-quality jobs, which have a flywheel effect, but their mandate is not job creation

India has added over 10 unicorns (privately held startup companies valued at over a billion dollars) so far this year, which is a rate of nearly one every five days. This comes after a record year of new unicorns (11 in 2021), which pushed India up to the third place globally, after the U.S. and China, in the Hurun Global Unicorn Index 2021. But what exactly does a unicorn valuation mean for the larger economy, and how do these technology-driven startups influence the employment scenario in the country? Thillai Rajan and P.K. Jayadevan discuss this question in a conversation moderated by P.J. George. Edited excerpts:

India has added 10 unicorns in just over 50 days this year, which is the highest rate so far for the country. What do you think are the fundamental reasons for this high rate now, and is it sustainable over time?



Thillai Rajan is Professor, Department of Management Studies, IIT-M, and co-founder, YMO5 Venture Engine

Thillai Rajan: I was looking at the unicorns that have emerged from India so far, and the number seems to be 91. The first unicorn emerged in 2011. From 2014, the number started to grow. In 2020, we had 10; and in 2021, there were 11. I'll give another example here: In 1953, two people climbed Mount Everest. Today, we have 500 to 600 every year. Becoming a unicorn is, in some cases, like scaling a summit.

The first unicorn in India was Info-Mobi. It took the company about five years to achieve unicorn status in 2011. The second unicorn was Flipkart. That company also took about four to five years to achieve unicorn status. Hasura, which is the latest unicorn, also took about five years. Hence, the process of becoming a unicorn has not eased. But it (unicorn status) has become a big motivator for entrepreneurs, and it's a summit that they would all like to scale. More and more entrepreneurs are aiming for unicorn status and this is one of the fundamental reasons, from the demand side, for the higher numbers.

Now, look at it from the supply side. Unicorns are essentially venture capitalist-funded companies, which have reached a \$1 billion valuation. If you look at the growth in

venture capitalist funding, between 2011 and 2020, the compounded annual growth rate was 70%. Over 10,000 companies were funded in those 10 years, and people expect this number to grow because of the potential in the economy. The growth might taper off over a period of time, but it is going to be there. A proportion of these companies are going to become unicorns. Hence, when the base is increasing, the number of unicorns is also going to be increasing.

Now, let's look at the environment. January 16 has been named as National Startup Day. If there is a national priority in terms of identifying, sustaining, supporting and recognising startups, that is going to lead to an increase in numbers; more unicorns are going to come.

However, the growth rate in the number of unicorns between 2020 and 2021 was in excess of 300% and that is unlikely to be sustained. In the financial markets, everything is in terms of cycles. We had the largest number of IPOs in 2007, that is 108. In 2010, there were 66 and in 2021, 63. In between these years, there were some very deep valleys. The same is going to be the case with unicorns as well.

If you look at the number of industry classes that we have in India, there are about 302 as per company registration. These industry classes represent very strong areas of economic activity. If on an average we take that there is a potential for three unicorns to emerge in each of these industry classes, we are talking about 1,000 unicorns. That is a strong potential for the growth to continue. It may not be the strong growth that we see today, but there will be growth as long as the country's economy is growing and venture capitalist funding is growing.

P.K. Jayadevan: When Professor Rajan was talking about Mount Everest, it reminded me of an example that we used to talk about at Freshworks, the Chennai-based company that went for IPO last year. We kept talking about how Roger Bannister ran the four first four-minute mile many years ago and then we saw many more people do it. Now, you have more experienced coaches,



and the ecosystem is more supportive. That is pretty much what is happening now in the startup space. Companies that are solving real problems with real customers should be the real winners. As for the unicorn valuations, they are outcomes of bets that venture capitalists submit, and they understand the risks involved. The valuations can go up and down since they have a lot to do with macroeconomic factors, cost of capital, demand, and supply. But fundamentally, good companies are being built out of India, and that's why you will see valuations going up, and when it is north of a billion, we have a unicorn.

I just want to add a few things to what Professor Rajan said. First, India is an open market with a fairly stable democracy, and having startups as a national priority is a big headwind. There are some kinks that need to be ironed out, but the fact remains that it is one of the largest markets in the world. Second, we have great data penetration. The cost of accessing the internet is very low these days, and the consumer base has become very big. The hope is that someday, all of these consumers will add up to a domestic market, which is big enough for these startups to make windfall returns. It means the startups will essentially tap into that consumer base using digital technologies. Third, we saw some really good IPOs in the last few years. Zomato and Freshworks are great examples. Underlying all these companies is

These are high-quality jobs which have a flywheel effect, which means employees will start their own companies or invest in newer startups and riskier ideas, and make bolder bets on innovation.

P.K. JAYADEVAN

great talent building high-quality technology products that are being adopted by enterprises and consumers. So, a huge amount of venture capital will come into India. In 2006, there were maybe three or four funds, which would hesitantly back some companies after due diligence of six months or eight months. Nowadays, you see cheques being cut over WhatsApp messages.

I'm not an economist, but the view is that there was a little bit of quantitative easing in the U.S. and interest rates have been kept low. Liquidity in the market led to asset price inflation and stocks went up. Even cryptocurrency, a risky asset, went up. As the cost of capital became cheaper, more venture capital happened. 'What do we do with these funds? Hey, here is the great Indian open market with support for startups, and great talent. Let's deploy it here.' In India, I suspect there is a little bit of a race (among venture capitalists) to provide funding for good companies, and that's probably why the valuations are sort of being pushed up.

What do you think will be the impact of the startups on the country's employment scene? How do you think startups will change the nature of employment?

P.K.J.: Directionally, it is true that startups have created jobs. Freshworks started with a few dozen employees and by the time it went public, there were 3,000. With that IPO, about 500 people became 'crorepatis'. I personally know of dozens of people who have gone out and started their own companies with team sizes of five to 10. Many of them have enough capital and they understand the market. So, the hope is that they will create high-quality jobs and it will become a virtuous cycle. These are niche, high-paying jobs and in the larger scheme of things, the numbers may not be high. But these are high-quality jobs which have a flywheel effect, which means employees will start their own companies or invest in newer startups and riskier ideas, and make bolder bets on innovation.

The question of mid-level, white collar jobs has been around for a long time. Automation will shift some of these jobs elsewhere, but I wouldn't say it's killing those jobs. In a country like India, which has access to the internet and the global market, it is a net positive as we can participate in this labour market as it becomes more and more remote.

T.R.: What is the mandate for startups? It is essentially innovation and growth. Through innovation and growth, they are able to create an impact. To achieve this growth and ability to innovate, startups take the help of technology or people. There are some startups which will really take the help of a lot of people, like food delivery aggregators. There are certain startups where growth will result in substantial job creation. There will also be certain startups which are largely technology-driven, where the employment opportunity might not be very high, but if the startups are going to result in growth, this can, as Jayadevan put it, have a flywheel effect, which can create a lot of employment either directly or indirectly.

But the mandate for startups is not really in terms of creating jobs but really in terms of the government does or

a public sector enterprise does, where job creation is an important metric. For a startup, it is a metric that is useful but it's probably not a target.

Having said that, we also need to see where the requirement is. Job creation is an important requirement for economic growth. Jobs are like a pyramid, which is always broader at the bottom. We need to be creating more jobs at the bottom so that the pyramid is stable. If startups are creating more jobs at the base of the pyramid, they are then catering to the requirement of the hour.

Do you think that the Indian startup sector is overvalued?

T.R.: In financial markets, asset prices are very dynamic and sentiments can play a very important role in valuation. When sentiments are good, the valuation seems to be on the higher side. There is a dominant view that asset prices today are inflated, not just for startups but in the overall stock market. I think I would subscribe to this dominant view that the asset prices today do not reflect true values, but then that's the nature of the financial markets.

I think angel investors and high net worth investors looking to invest in startups are very aware of the risks and cycles of the stock markets and these valuations will be able to bear it. They will understand the risks of these valuations because many of them are knowledgeable investors.

P.K.J.: I think there is froth in the market. But venture capital is risk capital, and people who allocate a portion of their wealth into venture capital understand the risks well. I think we also underestimate the genius of the markets. They know exactly which companies are just fiction and which companies are actually churning out profits and having good cash flows. Companies that don't have great fundamentals will be weeded out. There are no two ways about it. If there is no path to profitability, if there is no cash flow being generated, then you are looking at companies that have not fundamentally discovered a business model or a problem that they really want to solve, even after being in existence for many years.

Key takeaways from the start-up awards

Strengthening the 'i' factors — incubators, investors and IP — and govt push among others vital for success

DATA FOCUS

THILLAI RAJANA

Alongside the 'Azadi Ka Amrit Mahotsav' to celebrate 75 years of progressive India, we are also witnessing another celebration that is today seen as an amalgamation of youth, innovation and impact. I am talking about start-ups. It would have been a farfetched imagination if somebody had called out two decades ago that start-ups would become the center-stage in policy making. But here we are.

Among the different recognitions for start-ups, the National Start-up Awards and the National Technology Awards for start-ups and MSMEs given by the Indian government have received a lot of attention. Such awards celebrate entrepreneurship success and inspire many others to pursue their start-up dreams. What characterises the award winners?

Age, location

In general, all the award-winning start-ups would have demonstrated significant impact, since impact is one of the key assessment criteria in such awards.

The average age of awarded start-ups range between four and seven years, indicating that the awarded start-ups have been able to reach a scale in such a short span of time to be able to showcase impact.

However, a concern is the concentration of the awarded start-ups in Tier-1 cities.

The proportion of awardees from Tier-2 and other cities is even lower for National Start-up Awards as compared to National Technology Awards. Interestingly, start-ups from the city of Bengaluru account for close to one-third of the awards in the National Start-up Awards.



An analysis of start-up awardees*

	National technology awards		National start-up awards	
	2020	2021	2020	2021
Number of start-ups awarded	7	13	39	46
Incorporation				
Average age of start-ups at the time of award (years)	4.2	7.1	4.9	5.6
Number of different cities	7	9	14	13
Percentage of awarded start-ups from Tier-1 cities	57%	69%	79%	77%
Percentage of awarded start-ups from Bengaluru	14%	8%	38%	30%
Percentage of awarded start-ups from Tier-2 and other cities	43%	31%	21%	23%
Founders				
Average age of founders at the time of award (years)	42.2	49.5	39.6	41.4
No. of start-ups with women founders	4	1	9	13
Investors and funding				
Among the awardees, number of start-ups incubated	4	7	15	14
Among the awardees, number of start-ups funded	3	6	22	28
Average capital raised by start-ups till date (₹ in million)	NA	209.7	4,153.6	510.9
Average number of Angels in funded start-ups	0.0	0.5	2.2	2.3
Average number of VCs in funded start-ups	1.7	1.8	4.3	3.7
Intellectual property				
Number of start-ups with published patents	3	6	20	15
Average no. of patents published by start-ups with patents	2.0	6.7	5.9	4.3
Number of start-ups with trademarks	0	0	2	4
Avg. no. of registered trademarks for start-ups with trademarks	None	None	8.0	5.3

Source: YNOS Venture Engine *National start-up awards and national technology awards for start-ups and MSMEs

The average age of the founders during the year their start-up was awarded is in 40s, indicating a good combination of youth and experience. Founders of technology start-ups need to have more years of training and experience before they begin their ventures, and therefore it is natural that the average age of founders is higher in the case of National Technology Awards as compared to that of National Start-up Awards. An interesting aspect is the proportion of awarded start-ups with women founders.

About 30 per cent of the National Start-up Award winners have at least one women founder. The success of many start-ups with women founders underline the contribution of women to the success of their ventures.

Investors and funding

Incubation plays a more prominent role in the case of technology start-ups, as we see that more

than 50 per cent of the awardees were supported by incubators. The comparable ratio was only about 30 per cent for the National Start-up awardees. A large proportion of the start-ups in both the categories have also been funded by angel investors and VCs, indicating the strong the association of the investors with the success of these start-ups. However, the quantum of capital flow and the average number of investors are higher for the conventional start-ups as compared to the technology start-ups.

Intellectual property

While significant number of start-ups in both the categories have published patents, the ratio is higher in the case of technology start-ups as expected. However, more than one-third of the awarded start-ups in both the categories have published patents, indicating the importance given to creating intellectual property by start-ups for their long-term success.

The results lead to the following conclusions. First, a major ob-

jective behind the announcement of the National Start-up Day is to enable percolation of start-up culture at the grass roots level. That means, start-ups should nucleate across the length and breadth of the country. Currently, that is not happening. Second, the unstated aspiration of policy makers and industry leaders is to create start-ups that use avant-garde innovation or technology.

While the technology start-ups need more capital, it is the more conventional start-up that garners the lion's share of the capital. Government has a crucial role to play here if technology start-ups must flourish. Third, there is a strong correlation between start-up awards and one or more of the following factors: incubators, investors and intellectual property. Strengthening these 'i' factors would bring more success for start-ups.

The writer is Professor, Centre for Research on Start-ups and Risk Financing, IIT Madras; Associate, Harvard Kennedy School, Harvard University

Funding winter: Bank, NBFC loans to start-ups down 65% in 2023

Parvathi Benu
Chennai

The winter is biting for Indian start-ups. On the one hand, start-ups find it cumbersome to raise capital from angels, venture capitalists, and private equity investors and, on the other, funding through loans from banks and financial institutions has also decreased. Data from the analytics platform YNOS Venture Engine show that debt funding in India was down 65 per cent in 2023 (until December 22) compared to 2022.

DATA FOCUS.

In 2023, Indian start-ups cumulatively took loans worth ₹22,194.79 crore till September 23. In the corresponding period of 2022, the value of the loan taken was ₹63,513.7 crore.

Loans from banks are an important funding source for start-ups. Close to 7 per cent of the start-ups have taken loans from banks and NBFCs. In contrast, just a little less than 2 per cent of start-ups have secured angel funding, 2.7 per cent have been funded by a venture capitalist and less than 5 per cent are funded by government schemes.

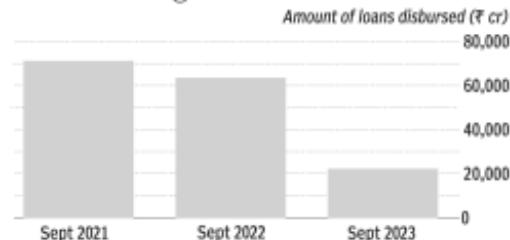
Experts think that the decline in loans taken last year could be due to the challenging period faced by start-ups making them postpone expansion plans. The creation of new start-ups was also down last year.

RELYING ON BANKS

In India, 563 financial institutions have lent money to start-ups. HDFC Bank leads, having funded 3113 start-ups until December 22, 2023. The State Bank of India comes next, funding 1,557 start-ups. However, SBI has disbursed the highest amount of loan at ₹39,518.2 crore. This is ₹15,162.105 crore more than the loan disbursed by HDFC Bank.

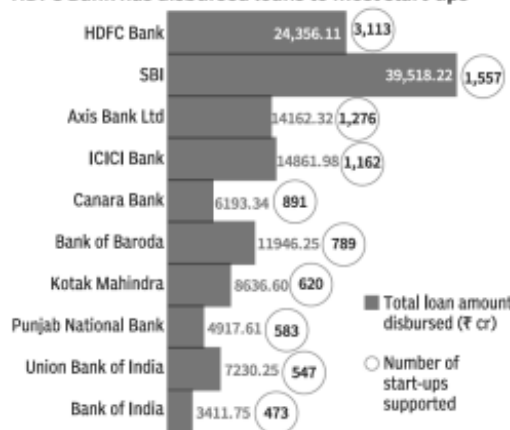
Thillai Rajan, Professor, Department of Management Studies, IIT-Madras, notes that banks have increasingly

Bank funding declines



563 Banks and NBFCs giving loans to start-ups | **13,218** Start-ups securing loans

HDFC Bank has disbursed loans to most start-ups



Source: YNOS Venture Engine

Data as on Sept 13, 2023

become more receptive towards start-up funding. "It is easier for a start-up founder to secure debt funding than raising capital from an angel or VC. The process is quite transparent with banks, and they are accessible for start-up founders from smaller cities and towns," he says.

Nived Priyadarshan, founder of Xplor, a Mobility as a Service (MaaS) platform, says that his team is looking forward to raising debt funds. "We see a reluctance among VCs and angels to invest amid the funding winter. Our platform has secured a seed fund, and we look forward to raising debt in the next round, preferably from a bank. Here, the lender has zero ties to internal business decisions as long as payments on the financing are made as per the financing contract," he says.

However, not all start-up

founders prefer the debt route. For instance, Bala Sundaresan, co-founder of Bengaluru-based start-up Nullpointer, says that at a pre-revenue stage, debt isn't quite attractive for start-up founders and that currently, it is not an option that his team is considering. "If the revenue is good and has no dilution, debt funding is an attractive option. Equity funding, on the other hand, is more suited and easier to get in the early stages," he says.

DELHI TOPS

Delhi NCR has the most number of start-ups funded through debt - 2,173. While 1,238 Mumbai start-ups have secured debt funding, Bengaluru comes only third in the list, with 1,182 start-ups funded this way. This is at a time when Bengaluru has the most number of VC and Angel funded start-ups.

IIT-M platform compiles details of govt.'s start-up funding schemes

The Hindu Bureau

CHENNAI

Researchers at the Indian Institute of Technology-Madras (IIT-M) Centre for Research on Start-ups and Risk Financing have developed an intelligence platform on government funding schemes for start-ups.

The platform has been developed and implemented in association with Ynos, a start-up incubated at the institute. The platform has been developed based on research and data collected by a team led by A. Thillai Rajan, a faculty in the Department of Management Studies and a principal investigator of CREST, an Institute of Eminence Research Centre of IIT-M.

Amitabh Kant, India's G20 sherpa, who launched the platform on Wednesday said the platform offered comprehensive infor-



The platform has been developed and implemented in association with Ynos, a start-up incubated at Indian Institute of Technology-Madras. FILE PHOTO

mation on government funding for start-ups on more than 100 schemes of various ministries and departments. Nearly 10,000 start-ups had benefited so far. The startups undergo rigorous verification and diligence, he said.

The platform offers contact details and social media links of the respective schemes to enable entrepreneurs to access them easily. Mr. Rajan said they were motivated to develop the platform to address the

information challenges that entrepreneurs faced.

“Information is scattered and does not address the stakeholders’ needs. CREST chose to demonstrate its global research leadership by addressing this national challenge. The result was the creation of a global standard intelligence platform on the Indian start-up ecosystem, which addressed the information challenges faced by early-stage entrepreneurs,” he said.

IIT-M launches incubators and accelerators information portal

TIMES NEWS NETWORK

Chennai: Startup founders across the country can identify and shortlist startup incubators and accelerators across the country using a web-based portal.

The Centre for Research on Startups and Risk Financing (CREST), an institute of eminence research centre at IIT Madras, on Monday launched 'Incubators', India's first information platform on incubators and accelerators.

The platform, developed in partnership with YNOS, an IIT Madras-incubated startup, contains comprehensive information on 920 incubators and accelerators.

Entrepreneurs end up spending a lot of time and effort to identify the incubator most suitable for their startup. The platform developed by CREST addresses this pa-

The portal helps start-up founders identify, compare and analyse incubators and accelerators easily by providing a list of the same

in point and helps the start-up founders to identify, compare and analyse incubators very easily.

"It gives an exhaustive list of incubators in the country that startup founders can reach out to for incubation support. It also provides information on various parameters which helps startup founders identify incubators suited for their requirement," said Thillai Rajan, department of management studies, IIT Madras, who is the principal investigator of CREST.

The Incubators platform has been developed using the latest technology tools to quickly analyse the incubator and accelerator landscape in

India. It features intuitive filters on multiple incubator parameters to quickly identify the set of incubators that satisfy different criteria for shortlisting and a facility to bookmark shortlisted incubators for detailed assessment at a later stage.

"The growth of the Indian startup ecosystem depends on a strong incubator ecosystem. Research has shown that there is a direct correlation between startup formation and number of incubators. Recognizing this, various governments have focused on strengthening the incubation ecosystem in the country," Telangana IT and industries secretary Jayesh Ranjan said.

IIT-M floats Incubators, a one-stop-shop for information on start-up accelerators

KV Kurmanath
Hyderabad

The Centre for Research on Start-ups and Risk Financing (CREST) at IIT Madras has launched a one-stop-shop information platform, called Incubators, that gives information on all incubators and accelerators in the country, helping founders to access information various centres that groom start-ups.

The platform provides information on various start-ups being supported by an incubator or accelerator; success ratio of the start-ups there; its investor network and whether it offers virtual incubation support. The platform was developed in partnership with YNOS, which was incubated at IIT Madras.

"While India had about

1,000 active incubators, there is no one single source from where you can get information. Entrepreneurs had to spend a lot of time and effort to identify the incubator most suitable for their start-up," Thillai Rajan, Professor at the Department of Management Studies, IIT Madras, said after the launch of the portal.

SINGLE SOURCE

"The platform developed by CREST addresses this pain-point and helps the start-up founders to identify, compare and analyse incubators very easily. Called 'Incubators', this AI-powered platform will help start-up founders to identify incubators and accelerators across India and shortlist one that best fits their requirements," Rajan, who is also the Principal Investigator of CREST

and Founder and Director of YNOS Venture Engine, said.

The platform was formally launched by Telangana IT and Industries Secretary Jayesh Ranjan in Hyderabad on Monday.

"Choosing the right incubator can significantly contribute to the success of the start-up in subsequent years. The Incubators platform can also benefit the CEOs and managers of incubation centres to get the attention of start-up founders," Jayesh Ranjan said.

"Getting information about various incubation centres has always been a challenge. Since there are information platforms that provided a one-stop resource on the incubation network in the country, entrepreneurs had to visit through multiple websites to get the information they needed," he said.

IIT-M develops India's first info platform on incubators

CHENNAI: The Indian Institute of Technology Madras (IIT-M) on Monday informed that it has developed India's first information platform on incubators and accelerators.

"The platform, developed in partnership with YNOS, an IIT Madras-incubated startup, contains comprehensive information on incubators and accelerators, which play an important role in helping startups navigate an uncertain entrepreneurial ecosystem," said a release from IIT-Madras.

While India had about 1,000 active incubators, until now, the information about them was scattered and not easily available in a single location. "Entrepreneurs spend a lot of time and effort to identify the incubator most suitable for their

start-up. The platform developed by CREST addresses this pain-point and helps the startup founders to identify, compare and analyse incubators very easily," added the press note.

Called 'Incubators', this AI-powered platform will help startup founders identify other incubators and accelerators across the country and shortlist the one that best fits their requirements, it added.

Incubation is a very critical phase in the startup life-cycle. Choosing the right incubator can significantly contribute to the suc-

cess of the start-up in the subsequent years.

"The platform will no doubt benefit incubators too in many ways. Being a neutral platform, it gives an opportunity to incubators to get the attention of start-up founders, policy makers, and investors and showcase the strengths of their incubation centres. The managers of the incubation centres can also use this to benchmark their facilities with other incubators and constantly achieve higher levels of performance," opined Jayesh Ranjan, IT secretary to Telangana government.



This gives an opportunity to incubators to get the attention of start-up founders, policy makers, and investors and showcase the strengths of their incubation centres

— Jayesh Ranjan, IT secretary to Telangana govt

IIT-M Launches Info Platform for Incubators



CHENNAI: The Centre for Research on Startups and Risk Financing (CREST), an

Institute of Eminence Research Centre at IIT Madras on Monday said it has developed an information platform exclusively for incubators and accelerators.

The institute said that while India had about 1,000 active incubators, until now, the information about them was scattered and not easily available in a single location. The platform, developed in partnership with YNOS, an IIT Madras-incubated startup, contains comprehensive information on incubators and accelerators, which play an important role in helping start-ups navigate an uncertain entrepreneurial ecosystem.

— Our Bureau

IIT-M launches info platform...

The Centre for Research on Startups and Risk Financing (CREST), an Institute of Eminence Research Centre at the Indian Institute of Technology, Madras (IIT-M) has developed India's first information platform on incubators and accelerators. The platform, developed in partnership with YNOS, an IIT Madras-incubated startup, contains comprehensive information on incubators and accelerators, which play an important role in helping startups navigate an uncertain entrepreneurial ecosystem....

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IIT-M unveils platform to collate info on incubators

EXPRESS NEWS SERVICE @ Chennai

THE Centre for Research on Start-ups and Risk Financing (CREST), an Institute of Eminence Research Centre at IIT Madras, has developed India's first information platform on incubators and accelerators.

The platform, developed in partnership with YNOS, an IIT Madras-incubated start-up, contains comprehensive information on incubators and accelerators, which play an im-

portant role in helping start-ups navigate an uncertain entrepreneurial ecosystem.

Though India has nearly 1,000 active incubators until now, the information about them are scattered and not easily available in a single location. Entrepreneurs have to spend a lot of time and effort to identify the incubator most suitable for their start-up.

Called 'Incubators', this AI-

powered platform, developed by CREST, will help start-up founders to identify incubators and accelerators across India and shortlist one that best fits their requirements, said a press release from IIT Madras.

Incubation is a very critical phase in the start-up life-cycle. Choosing the right incubator can significantly contribute to the success of the start-ups. The Incubators Platform can also ben-

efit the CEOs and managers of incubation centres to get the attention of start-up founders for their incubation centres and benchmark themselves against comparable incubators and constantly improve their effectiveness.

Other stake holders associated with the development of the start-up ecosystem such as educational institutions, government and funding agencies, would also benefit from this platform, it added.



IIT-Madras platform to search incubators, accelerators for startups launched in city

The Hindu Bureau HYDERABAD

Centre for Research on Start-ups and Risk Financing (CREST) of IIT-Madras on Monday introduced an

information platform of incubators and accelerators. Launched here by IIT Secretary Jayesh Ranjan, the platform is intended to fortify the incubator ecosystem.

Developed in collaboration with YNOS, an IIT Madras-incubated start-up, the platform addresses a long-standing challenge in the entrepreneurial land-

scape. With approximately 1,000 active incubators across India, entrepreneurs faced difficulties navigating the scattered information. An AI-powered platform, the 'Incubators'

streamlines this process and help startups to identify, compare and analyse incubators nationwide.

Elaborating on the need for such tools, professor A. Thillai Rajan

said, "During the initial few months after incorporation, startups face a high degree of uncertainty. They need a lot of support, handholding and mentoring."

IIT-M CREATES GEN AI TOOL FOR STARTUPS

Sindhu.Hariharan@timesgroup.com

While Gen AI and advanced analytics has emerged as a pet theme for India's startups today, where do startup founders go for accurate information about entrepreneurship? This was the thought that led researchers at IIT-Madras to create a Gen AI tool that provides accurate information in an easy-to-access format to different stakeholders of the country's start-up ecosystem.

The team has created a Gen AI tool called Startup GPT that answers users' queries on India's startup founders, their backgrounds, num-



Startup GPT team (L-R): Shailendra Gupta, full stack engineer, Priyadarshini Devadas, data analyst, Thillai Rajan A, professor and principal investigator, M Alagu Kumar, data analyst, and Ramesh Kuruva, project scientist

We have used OpenAI LLMs only for creating context aware queries and to construct the response after the re-ranking of the search process. Other open source models were used to analyse the intent and for retrieving information from relevant documents. Significant R&D effort was involved in putting the different modules together, while mitigating potential security issues that could arise.

Thillai Rajan A | AREA CHAIR (FINANCE), DEPARTMENT OF MANAGEMENT STUDIES, IIT MADRAS

only was the quantum of work at a very high level, but also the quality of work. Significant R&D effort was involved in putting the different modules together, while mitigating potential security issues that could arise. Being the first of its kind, there was no existing documentation that the team could follow and most of the integration had to be done de novo," Rajan says.

While one can get all this information from any search engine or ChatGPT itself, Rajan says that Startup GPT stands apart in its "pointed, specific, and precise" responses. "Since the model runs on our database, the answer is devoid of hallucinations or inaccuracies characteristic of other LLMs that crawl over billions of data parameters to get the answer," he says. For instance, we tried posing a question to Startup GPT that was unrelated to the start-up ecosystem and the engine avoided winging its own answers and responded that it cannot answer it.

Startup GPT is free to use. The team is now looking at reaching a larger audience by bringing in voice and multilingual features. The team is also looking for trusted information partners to scale this, including public sources/ government data. "With government participation, Startup GPT can truly be a powerful tool to help accelerate the entrepreneurship momentum," Rajan says.

STARTUP STORIES

ber of startups location-wise, details on various VC firms and their investment portfolio, and other details. To provide answers, the tool scores through a large startup database developed by researchers at the Centre for Research on Startups and Risk Financing (CREST) along with IIT-M startup YNOS Venture Engine. CREST's startup database covers more than 199,000 startups, 10,800 angel investors, 4,700 VCs, and over 950 incubators, and provides organised and updated information on the ecosystem.



Chinni Chaitanya, Technical Lead



Satyam Anand, Senior Data Scientist

"What Startup GPT brings is the freedom to ask for information in a free-flowing conversational form without the need to tailor the query according to the platform's features. Such free flow of information would substantially reduce the information divide that exists today in the Indian startup ecosystem and

benefit millions of aspiring as well incumbent entrepreneurs, apart from investors and policymakers," Thillai Rajan A, area chair (finance) in the department of management studies at IIT Madras, and head of CREST, says.

Startup GPT was developed at IIT-M by a team of data scientists, developers and interns at CREST (an Institute of Eminence Research Centre) led by Rajan, who is also the founder and director of YNOS Venture Engine.

Rajan says they already had a database with all the information, and sitting on this treasure trove, they thought why not make it more accessible for users to query.

OpenAI LLMs (large language

models) were used as a base. "We wanted to avoid training our own LLMs, which can be very expensive in the initial stages. But we have used OpenAI LLMs only for creating context aware queries and to construct the response after the re-ranking of the search process. Other open source models were used to analyse the intent and for retrieving information from relevant documents," he says.

The large dataset that forms the base of the chat tool was previously processed to appropriate ML tools and stored for efficient search retrieval. "The whole process involved significant effort since it meant bringing together different components to work seamlessly Not



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I honestly believe we are at the right time where we put all this information together and given the fact that this has been done in a very dedicated manner, there should be easy ways to share information between different agencies. While this is really a public good, we certainly we might have to put a revenue model behind it for it to be self-sustaining.



SHRI. SIVASUBRAMANIAN RAMANN

Chairman and Managing Director, Small Industries Development Bank of India
at the Inauguration of the International Confluence Conference on Start-ups
and Innovation, December 13, 2023

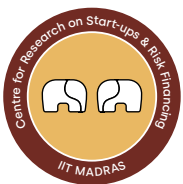
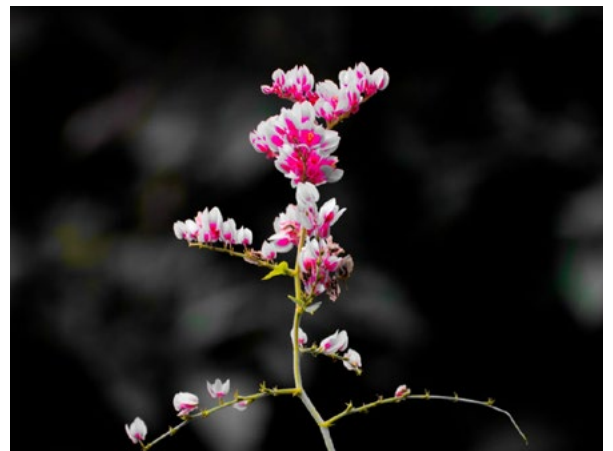
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I believe this platform is certainly addressing a gap in our visibility of the innovation ecosystem—how vast, deep, and diversified our start-up innovation ecosystem is. I view this as a valuable resource for researchers who will study and utilize it to comprehend the growth within the ecosystem. This understanding can also help public policymakers in crafting responses and initiatives aligned with these dynamics. This holistic approach is crucial for comprehensively researching the innovation ecosystem, particularly to understand the thriving start-up innovation ecosystem that we have created in the past 2-3 years.



SHRI. RAJEEV CHANDRASEKHAR

Union Minister, at the launch of the Investor Information and Analytics Platform,
February 26, 2024



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