

Profile

Name

Dr. Sanjay Bhardwaj

Designation

Scientist “G” and Head

Qualification

Ph.D. obtained at: IIT Bombay, Mumbai

Doctoral thesis title: “Developing a Commercialization Model for the Advanced Materials Technology Sector in the Indian Context”

Highly Commended Winner in the Emerald / EFMD Outstanding Doctoral Research Award, sponsored by International Journal of Operations & Production Management (IJOPM) – a top ranked and official journal of the European Operations Management Association

Experience

- Over 27 years’ experience in different facets associated with commercialization of R & D results, application development, process engineering and production planning. Typical areas include
 - Technology Readiness Levels (TRLs) - based **Collaborative and Technology Transfer Models**, derived from my Doctoral research work, have been methodologically implemented at ARCI for nearly a decade to boost translational research culture. This mainly included: (i) assessing the Technology Readiness Levels (TRLs) of R & D keeping in view mainly the nuances of domains / lab - industry interaction, (ii) identification of value addition needs at different TRLs, for translation of research to transferable technologies, and (iii) creating **collaborative / technology transfer models for optimum utilization of R & D at several TRLs (from ‘early stage R & D’ to ‘higher TRLs’)**. This initiative **towards ‘maximizing the utilization of ARCI knowledge-base and R & D capability’** has played key role in significant growth in (a) the ‘collaborations for effective use of R & D capability , for translational research / technology transfers’, and (b) also the ‘number of leads exploring the possibility of partnerships / technology transfers’
 - Working with R & D teams and external stakeholders to develop/implement the strategies for commercialization of R & D results



Emerald/EFMD Outstanding
Doctoral Research Awards

**Highly Commended
Award 2015**

- Negotiating/finalizing Agreements to forge partnerships for collaborative R & D, sponsored R & D, contract R & D , commercialization option and technology transfers
- Designing/implementing outreach programmes for novel technologies and technology-based-products, performing techno-commercial feasibility analysis for technologies being developed/demonstrated
- Conducting patent/competition analysis, valuation of technologies and technology-based-products
- Application development, production planning, process engineering
- Served as **Chairman, Indian Institute of Chemical Engineers – Hyderabad Regional Centre (IICHe – HRC)** during **2019 – 2023**. HRC received **Best Regional Centre Award during 2019, 2021, and 2022** from the IICHe
- Received IICHe – ICI India Ltd. Award 2018. The award recognized significant success in developing an innovative model to translate scientific knowledge into industrial/commercial applications for wider social relevance. **Work includes TRL-based Collaborative / Technology Transfer Models and associated concepts useful for R & D / intellectual capital commercialization**
- Has been involved in forging collaborations / technology transfers for ARCI's materials-based-technologies with several organizations, including start-ups/established companies. Negotiated / finalized nearly 250 Agreements for technology transfer, technology development and demonstration, collaborative R & D, contract / sponsored R & D, commercialization option, technical services, and material transfer
- Led Project - Centre for Knowledge Management of Nanoscience & Technology (CKMNT) supported by National Nano Mission (Department of Science & Technology, Government of India) from January 2015 to September 2016
- Co-Project Investigator for Project – “A Comprehensive Study on Role of Tax Incentives in Promoting R & D in the Country” sponsored by National Science and Technology Management Information System (NSTMIS), Department of Science & Technology, Government of India. Report submitted in October 2021
- Took initiatives, which culminated in signing of the first international Technology Transfer Agreement of ARCI with a Singapore-based company
- Guidance to postgraduate students for their internship projects

Research Areas of Interest

Research Collaborations, Strategic Technological Alliances, Technology Transfer and Commercialization Process, Technology Marketing and Transfer, Science & Technology-based Entrepreneurship, Technology Foresight, Patent Analysis and Intellectual Property (IP) Management

Papers in Peer-reviewed Journals and Conference Proceedings/Book Chapter/Short Articles

TOTAL: 51 Nos.

(Peer-reviewed Journal Papers/ Conference Proceedings: 21 nos., Book Chapter: 1 no. and Short Articles: 29 nos.)

- **Following four papers discuss useful concepts for (i) assessing intellectual property / R & D / technology readiness, (ii) linking R & D capability with appropriate collaborative models to enhance the impact of intellectual capital available with organizations, and (iii) technology transfer and commercialization. Insights provided are especially relevant for organizations working towards commercialization of R & D results in the advanced materials domain:**

(1) Bhardwaj, S., and Jain, K. (2024). 'Commercialising the Advanced Materials R&D in the Indian Ecosystem', **Asia-Pacific Journal of Management Research and Innovation, Sage Journals** <https://doi.org/10.1177/2319510X241238872>

Abstract: Research and Technology Organisations (RTOs) are expected to manage the value chain involving the development, demonstration and transfer of technologies. Different technology commercialisation (TC) models, which provide a guiding framework for the management of this value chain, have been proposed in the recent past. The capability of these TC models to address challenges specifically associated with the commercialisation of advanced materials technologies is assessed and a conceptual model is proposed. A case study associated with the commercialisation of advanced materials technology is used to refine the conceptual model. It was found that the conceptual model requires appropriate adjustments especially when an RTO and an industrial organisation have collaboratively worked to realise successful commercialisation.

Keywords: R&D; technology commercialization; technological innovation; technology development; technology transfer; advanced materials; technical entrepreneurship.

(2) Bhardwaj, S., Padmanabham, G., Jain, K., Momaya, K.S. and Joshi, S.V. (2015). 'Strategic alliances for advanced materials' intellectual property value chain: research and technology organisation's perspective', **International Journal of Intellectual Property Management**, Vol. 8, Nos. 3/4, pp.207–226.

Abstract: Intellectual property value chains (IPVCs) comprise exploratory studies, laboratory demonstration, field tests, transfer and/or commercialization of technologies. Strategic technological alliances (STAs) between different organisations aim at strengthening the IPVCs. This phenomenon has influenced research and technology organisations (RTOs) due to their important role in the IPVCs. Characteristics of technology area, e.g., advanced materials technology (AMT) for this paper, play a crucial role for such alliances. An RTO shall be responsible for arranging complementary assets during exploratory studies, laboratory demonstration and field test stages, while commercialising entity shall be responsible for

assembly of complementary assets for competitive manufacturing and marketing. In this paper, an attempt has been made to develop two-step process including: 1) assessment of the level of technology development using intellectual property development indices (IPDIs) for advanced materials technologies; 2) proposing a matrix to assist RTOs in identifying the useful partners from industry, academia and R&D.

Keywords: strategic alliances; innovations; research and technology organisations; RTOs; R&D; advanced materials; intellectual property development indices; IPDIs; cooperative strategies.

- (3) Bhardwaj, S., Padmanabham, G., Jain, K. and Joshi, S.V. (2015). 'Innovation paradigms: contractual models for research and technology organisations', *International Journal of Technology Transfer and Commercialisation*, Vol. 13, Nos. 3/4, pp.133–153.

Abstract: Co-development partnerships are increasingly being used to enhance innovation effectiveness and leverage complementary capabilities of partner organisations. A perceptible transition from closed innovation paradigm to open innovation paradigm is also observed. This trend is consistent with the thinking that capabilities necessary for creating innovations are often not completely available within a single organisation. Furthermore, the intellectual property (IP) regime is getting stronger by the day. These changes in the macro-environment coupled with the need to access complementary capabilities have spurred the need for novel contractual models, which facilitate transactions involving IP and other assets between different organisations. In this backdrop, the authors have attempted to analyse the trend of contractual models that have either already been adopted or are in the process of adoption by an Indian research and technology organisation (RTO) involved in the development, demonstration and transfer of materials-based technologies. This paper specifically addresses issues associated with partnerships that attempt to embrace open innovation paradigm in the face of progressively strengthening IP regimes, and their implications on contractual models suited to an RTO, with illustrative examples.

Keywords: innovation paradigm; intellectual property; open innovation; contractual models; research and technology organisations; RTOs; research and development; R&D; technology development; technology transfer; technology commercialisation; innovation; research.

- (4) Sanjay Bhardwaj, G. Padmanabham, Karuna Jain, D. Srinivasa Rao and Shrikant V. Joshi (2017). 'Technology commercialization in the advanced materials sector: Indian context', *Journal of Intellectual Property Rights*, Vol. 22, No. 3, pp. 154-167.

Abstract: This study is aimed at developing insights into the Technology Value Chain (TVC) of advanced materials-based technologies using a scenario in which technology has been transferred by a Research and Technology Organization (RTO) to a Small and Medium Enterprise (SME) in the Indian context. A Conceptual Theoretical Model (CTM) using constructs from existing TVC models is used as a basis for the case study described in this paper. This model is refined using actual evidence from an Indian RTO - the International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad. The TVC of ARCI's proprietary Detonation Spray Coating (DSC) technology is used to expand upon the CTM as well as to provide new insights wherever possible. The TVC adopted for DSC includes

technology incubation and proof of concept in advance of transferring the technology. These strategies, aided by government funding of the technology recipient companies, were observed to play an important role in successful commercialization.

Keywords: Technology commercialization; technology value chain; advanced materials technologies; detonation spray coating.

Research Papers Presented in International / National Conferences / Seminars

22 research papers

Technology Foresight/ Techno-commercial Feasibility/ Patent Analysis Reports Prepared / Supervised

Over 100 reports for

- (a) the companies in the oil and gas, ceramics, chemical, cosmetics and personal care domains
- (b) governmental agencies , and
- (c) in-house R & D / technological programmes in the advanced materials' / related domains

Invited Lectures/Presentations/Panelists in the Panel Discussions

- Delivered more than 200 Invited lectures/presentations (including chief guest/ guest of honour/keynote/plenary lectures) during Faculty Development Programmes, Technology-based Entrepreneurship Development Programmes, Management Development Programmes, National/International Conferences, Seminars, Symposiums, Workshops , Panel Discussions etc. organized by IIT Bombay, IIT Madras, IIT Roorkee, IIT Jammu, IIM Jammu, National Institute of Industrial Engineering (NITIE) Mumbai, AIIMS Patna, Administrative Staff College of India (ASCI) Hyderabad, University of Hyderabad, BITS Pilani – Hyderabad campus, Rajiv Gandhi University of Knowledge Technologies (RGUKT), Engineering Staff College of India (ESCI) Hyderabad, Osmania University, JNTU Hyderabad, Confederation of Indian Industry (CII), World Intellectual Property Forum (WIPF) and several other organizations
- Chair /speaker in panel discussions/ Round Table Meets – 24 nos.
- Spoke on themes like R & D/technological collaborations, R & D planning, technology transfer and commercialization, IP competitive intelligence, strategic technology alliances, technology assessment, patent analysis, new product development, contractual interaction models, new enterprise creation, product launch and growth strategies, strategic technology planning, open innovation, IPR management, technology scouting and technology adoption cycle

- Nearly 18,000 stakeholders representing industry, academia, R & D and others reached out through above interactions. Major highlights are : (a) Youtube lecture titled “Technology Transfer and Commercialization” delivered in National Webinar on ‘Technology Transfer in Pharmaceuticals’ on 17th April 2021 has 7,226 views , 234 likes as on 24th April 2024 (URL: <https://www.youtube.com/watch?v=s-OEPgHTvIw>); (b) invited lectures on “Technology Commercialization and Entrepreneurship: Understanding the Upscaling Process” and “Technology Commercialization and Entrepreneurship : Opportunities from ARCI” in Seminar on Early-Stage Entrepreneurs , organized by University of Hyderabad (UoH) – Institution’s Innovation Council and Technology Enabling Centre – UoH on 29th June 2021 has 638 views,28 likes as on 24th April 2024 (URL: <https://www.youtube.com/watch?v=nnGKL2TNnv8>); (c) 5000+ participants in an invited lecture on “Intellectual Property (IP) Commercialization” on 2nd September 2020 organized by Gujarat Student Startup and Innovation Hub (i-Hub) , an initiative of the Education Department , Gujarat Government

Major Awards, Honours and Recognitions

- Emerald/EFMD Outstanding Doctoral Research Award for my doctoral research work addressing the theme of technology transfer and commercialization. Award was sponsored by International Journal of Operations & Production Management (IJOPM) , Emerald Group Publishing Limited UK and European Foundation for Management Development (EFMD). IJOPM is one of the leading journals in the world in the field of Operations Management.

(Details: emeraldgrouppublishing.com/archived/research/awards/pastodras_2015.htm)

- Best paper award for paper titled “Translational Research in Sonochemistry”, presented IChE – CHEMCON 2023, An International Conference on Energy Transition: Challenges and Opportunity, 27-30 December 2023, HIT Kolkata
- Indian Institute of Chemical Engineers (IChE) - ICI India Ltd. Award 2018 for Excellence in Process or Product Development. Award, presented during CHEMCON 2018 International Conference, recognized the significant success in developing an innovative model to translate scientific knowledge into industrial /commercial applications for wider social relevance
- IIT Bombay - Chapter Service Award 2021 on 26th December 2021 in recognition of outstanding contributions to the Hyderabad IITB Bombay Alumni Chapter and to the progress of the Institute
- IIT Bombay Heritage Foundation / IIT Bombay Alumni Association – Volunteer of the Month Recognition (September 2021) for significant contributions in conceptualizing and implementing several activities of IITBAA / Healthcare Group specifically Healthcare 2030 Live, a virtual Summit organized on 11th September 2021

- Bharat Vikas Award 2017 for loyalty, diligence and outstanding performance in the field of Science & Technology based Entrepreneurship conferred by Institute of Self Reliance, Bhubaneswar, India
- 1st prize in 'Quiz on Intellectual Property' conducted during 'Workshop on Managing Innovation & Intellectual Property' at the 3rd International Conference on Management of Intellectual Property and Strategy (MIPS) 2016 at Mumbai during July 2016
- Appreciation Certificates/Letters from All India Manufacturers Association (AIMO) – AP Chapter, Federation of Andhra Pradesh Small Industries Associations (FAPSIA) and Andhra Pradesh State Financial Corporation (APSFC) for initiatives in the field of technology-based entrepreneurship
- "Best Stall Award" for efforts in promotion of materials technologies for entrepreneurship, while independently managing ARCI stall at Exhibition entitled "INDUS EXPO 2003" organized by National Small Industries Corporation (NSIC) and M/s Bowstring at Hyderabad (November 2003)
- Appreciation Letter from E.I. Dupont India Limited, New Delhi for successfully developing new customers for polymer materials like Nylon-6 and Polyacetal resins during MBA Professional Training (June – August 1997)
- Institute-cum-Merit Scholarship and Marshall Charitable Foundation Bombay's Scholarship during B.Tech. at Harcourt Butler Technological Institute (HBTI) Kanpur {now Harcourt Butler Technical University (HBTU) Kanpur}
- Contributed as Member of Management Committee for Technology Business Incubator of a Hyderabad-based Engineering College, Entrepreneurship Development Cell a Warangal-based Business School

Major Contributions to Professional Societies / Other Forums / Related Awards and Recognitions

- Chairman, Indian Institute of Chemical Engineers - Hyderabad Regional Centre (IICHe-HRC) for the year 2019 – 2023.
- As Chairman, Indian Institute of Chemical Engineers – Hyderabad Regional Centre (IICHe – HRC) , received Annual Trophy of
 - Best Regional Centre Award 2022 in the CHEMCON 2022 Conference and 75th Annual Session of IICHe at Harcourt Butler Technical University (HBTU), Kanpur during 27th – 30th December 2022
 - Best Regional Centre Award 2021 in the CHEMCON 2021 Conference and 74th Annual Session of IICHe held at CSIR – Institute of Minerals and Materials Technology, Bhubaneswar during 26th – 30th December 2021
 - Best Regional Centre (BRC) Award - 2019 was conferred on the IICHe – HRC at 72nd Annual Session of IICHe / CHEMCON 2019 Conference held

at Indian Institute of Technology (IIT) Delhi during 15th - 19th December 2019. Contributed as Honorary Regional Secretary, IChE - HRC (2018-19)

- Organizing Secretary, Indian Chemical Engineers Congress (CHEMCON) Conference 2020 & 73rd Annual Session of IChE (online mode) on theme “Exploring Recent Trends in Chemical Engineering” during 27th – 29th December 2020 organized by IChE Headquarters and IChE - Hyderabad Regional Centre.
- Vice-chairman, 18th Annual Session of Chemical Engineering Students’ Congress (SCHEMCON 2022) on theme “Sustainable Technological Advancements in Chemical Industries – 2022” organized by Department of Chemical Engineering, NIT Warangal and IChE – Hyderabad Regional Centre during 23rd – 24th September 2022 at NIT Warangal
- Co-convenor, International Conference on “Recent Advances in Chemical Engineering” 2020 during 8th - 9th January 2020 organized by Department of Chemical Engineering, University College of Technology, Osmania University and IChE - Hyderabad Regional Centre.
- Honorary Regional Secretary, Indian Institute of Chemical Engineers - Hyderabad Regional Centre (IChE-HRC) and Co-Chairman of Academia – R & D – Industry interaction Committee / Industrial Visit Committee, IChE- HRC for the year 2018 -19 and 2017-18.
- Honorary Joint Secretary, Indian Institute of Chemical Engineers - Hyderabad Regional Centre (IChE-HRC) and Co-Chairman of Industrial Visit Committee, IChE- HRC for the year 2016-17.
- President, IIT Bombay Alumni Association (IITBAA) – Hyderabad Chapter for the year 2019 – 2020 and Joint Secretary, IITBAA – Hyderabad Chapter for the year 2018-19.
- Chair, technical session on Innovation Systems, Member of the panel for the selection of the best paper under “student” and “non-student” categories, Technical Committee Member, and Reviewer in the 28th International Conference of the International Association for Management of Technology (IAMOT) 2019 organized at Mumbai during 7th – 9th April 2019
- Chairman, Technical Session on Material Science and Engineering (MSE) during International Conference on Advances in Chemical & Material Sciences (ACMS – 2022) organized by Indian Institute of Chemical Engineers (IChE) HQ in association with

Heritage Institute of Technology Kolkata, NIT Jalandhar and Osmania University
College of Technology , Hyderabad during April 14-16,2022

- Chairman, panel discussion on “challenges , threats and opportunities in Chemical Engineering and allied areas” and Chairman, poster session in International Conference on “Recent Advances in Chemical Engineering (RACE) – 2020” organized by Osmania University College of Technology , Hyderabad and IChE – Hyderabad Regional Centre on Golden Jubilee Celebrations of OUCT (8th – 9th January, 2020)
- Chairman, technical session, in CHEMCON 2018 - International Conference on Seamless Chemical Engineering in Service of Humanity: Innovations, Opportunities & Challenges at NIT Jalandhar during 27th – 30th December 2018
- "Best Stall Award" for efforts in promotion of materials technologies for entrepreneurship, while independently managing ARCI stall at Exhibition entitled "INDUS EXPO 2003" organized by National Small Industries Corporation (NSIC) and M/s Bowstring at Hyderabad (November 2003)
- Member, National Committee for Industry – Institute interaction, Indian Institute of Chemical Engineers (IChE) for the year 2020
- Member, International Relations Committee , IChE for the year 2023
- Mentor
 - ✓ Innovation Club, All India Institute of Medical Sciences (AIIMS) Patna from August 2018 – July 2019
 - ✓ Atal Incubation Centre – Dr. Babasaheb Ambedkar Marathwada University Aurangabad
- Member, University Technology Management Cell, V N Marathwada Krishi Vidyapeeth (Agricultural University)
- Contributed as Member , Expert Group (August 2022 – September 2023) on Technology Readiness Levels (TRLs), constituted by Confederation of Indian Industry (CII)
- Member of the selection committees for recruitment / promotion of the scientific / technical personnel in government funded organizations

- Reviewer of the research papers in Journals / Conferences on themes like IP / Technology Transfer/ Technology Commercialization / Innovation

Membership of Professional Societies

- Fellow - Institution of Engineers (India)
- Fellow - Society for Technology Management
- Fellow - Indian Institute of Chemical Engineers
- Life member - Materials Research Society of India
- Life member - Indian Institution of Industrial Engineering
- Life member - Global Institute of Flexible Systems Management
- Life member – The Society for Polymer Science (India)

Post-graduate Students Guided

10 students on the following projects:

- Thermal Spray Coating Market in India
- Nanotech for Healthcare
- Concentrated Solar Power – Parabolic Trough Receiver Coatings
- Electric Vehicle Technology – A Patent Analysis
- Fuel Cell Technology – A Patent Analysis
- Feasibility Study of Sol-gel Coated Polycarbonate Sheet with Anti-scratch Property
- Feasibility Study of Exfoliated Graphite Bipolar Plate used in PEM Fuel Cell
- Feasibility Study: Solar Spectral Selective Coating for Concentrated Solar Thermal Power Applications
- A Study on Leadership Styles in R& D
- Materials Technologies (under ARCI's Graduate trainee programme)

Contact Information

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