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From *Vigyan Jathas* to Science Festivals: A New Avatar of Public Engagement with Science in India

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ABSTRACT

Science festivals have emerged as pivotal platforms for popularizing and celebrating science, engaging with the public, and showcasing the latest advances in science and technology. Inspired by the inaugural science festival in Edinburgh, contemporary festivals in India represent a modern iteration of the *Vigyan Jathas* organised by the People's Science Movements (PSM) in the 1960s. This article traces the evolution of public engagement with science in India, from the grassroots efforts of *Vigyan Jathas* to today's large-scale science festivals. It examines the key features of these festivals, the opportunities they present for science communication, and their impact on public engagement. Additionally, the paper explores the roles of science festivals in career inspiration, intergenerational learning, promoting public dialogue on scientific issues, and embedding science within the cultural fabric of host cities. By analysing these aspects, the article aims to provide a preliminary overview of the current landscape and future directions for science festivals in India.

Keywords: Science festival; Science communication; Public engagement; Science outreach; popularisation of science and technology

1 Introduction

In today's world, science and its applications permeate every aspect of our lives, making it essential to communicate its omnipresence and implications. Contemporary science festivals aim to bridge the gap between science and the public, making science

accessible, engaging, and relevant. Originating in Edinburgh, Scotland, in 1989, these science festivals have proliferated globally, particularly in the past decade, reaching more than 5 million people annually (Gribbin *et al.,*1989; Gathings *et al.,*2021). Alongside science museums and science centres, they have become key public venues for promoting informal science learning and fostering public dialogue about science.

The global expansion of science festivals aligns with a broader increase in interest and investment in science communication and public engagement across countries. Governments and scientific institutions worldwide increasingly recognize the importance of these activities in enhancing the societal impact of science. India, too, has witnessed a similar trend, building on traditional efforts to promote scientific literacy by both government and non-government organizations over the past several decades.

In the 1960s, India saw the rise of grassroots social movements, such as the People's Science Movements (PSM), aimed at spreading scientific literacy (Venkateswaran, 2020). These movements emerged during a time when post-independence India was focused on Science and Technology (S&T)-led social and economic development and the popularization of science was considered important to promote social and economic equality. The PSMs, led by 'science activists' who were mostly current and retired scientists, worked to dispel superstitions and myths by disseminating scientific knowledge through *Vigyan Jathas* (science processions). These processions were perhaps early examples of 'public celebrations of science' organized by collectives and individuals and serve as precursor to the contemporary 'science festivals'.

Currently, science festivals in India are organised by government bodies, scientific and educational institutions, and science-based industries to celebrate science, raise public awareness of scientific research and innovations, and inspire young people to pursue careers in STEM (Science, Technology, Engineering, and Medicine). While the scope and scale of science festivals vary, most aim to demystify science, making it more accessible and relevant to everyday life, which can ultimately result in improved public understanding of and support for scientific research and innovation.

While young people are the primary target of most science festivals, these events attract a diverse audience from the host city, across the country, and even from other nations. This broad appeal is driven by a shared curiosity and enthusiasm for new scientific knowledge, which participants can explore in a socially engaging and enjoyable atmosphere (Jensen, E., & Buckley, N., 2014). For scientists, the motivation to participate in science festivals stems from their desire to inform, excite, and inspire the public about scientific advancements (Gavhi-Molefe *et al.* 2021). The interaction between scientists and the public fosters a dynamic environment where learning and inspiration thrive, bridging the gap between scientific communities and society.

A significant difference between the *Vigyan Jathas* and today's science festivals lies in their approach to engaging with the public. *Vigyan Jathas* typically bring science to people, particularly targeting the general public in rural areas as a means of social upliftment and to promote critical thinking to bust superstitions and other harmful practices. In contrast, contemporary science festivals attract people through strategic promotions and marketing, primarily focusing on urban and semi-urban youth audiences as a way to inspire and nurture the next generation of scientists and improve visibility of indigenous and global research advances.

However, there is a noticeable gap in documented evidence detailing the specific impacts of both these formats on public engagement with science. Due to this lack of comprehensive information and data, this paper will not compare the two formats directly. Instead, it will focus on exploring and analyzing science festivals as an emerging form of public science engagement in both India and the global context, assessing their scope, objectives, and potential impact. By identifying current gaps and suggesting improvements, this paper emphasizes the need for continuous evaluation and innovation in science communication practices in India.

2 Science festivals in India

Science festivals in India span across governmental, non-governmental, and educational sectors, each with its own unique focus and audience. The National Children's Science Congress (NCSC), launched in 1993 by the Ministry of Science and

Technology, engages children aged 10-17 in innovation, critical thinking and problem-solving using scientific methods. Similarly, the India International Science Festival (IISF), held annually since 2015, showcases S&T advancements across various cities. Since 2007, in collaboration with various central and state governments, *Vijnana Bharati* has also organized the *Bharatiya Vigyan Sammelan* to blend traditional and modern science through regional languages.

In the non-governmental space, the India Science Festival (ISF), initiated by FAST India in 2020, targets young adults and the public. Additionally, higher education institutions like IITs and IISc host student-led S&T festivals (e.g., Shaastra, Techkriti) that focus on innovation and skill-building.

While these festivals attract large audiences with demonstrations, competitions, and expert panels, smaller for-profit festivals, such as the The Great Indian Science Festival or Bangalore Science Festival, often cater to younger, localized audiences and focus more on STEM education than broader public engagement.

This spectrum of science festivals reflects India's growing emphasis on promoting science and technology across diverse demographics.

A notable difference between government and non-government-organized festivals lies in both their focus and reach. Government-led festivals primarily showcase indigenous research and advancements, leveraging extensive networks to reach a wider audience. In contrast, non-government festivals typically spotlight emerging scientific themes and global innovations, often engaging a more targeted audience through specialized promotion and marketing efforts.

3 Key features of science festivals

Review of science festivals globally have resulted in the following key characteristics: a focus on celebrating science and raising public awareness, engaging non-specialists, particularly young people, to inspire interest in STEM fields, a finite duration with a tendency to recur annually or biennially, and a unifying theme or branding. Moreover, science festivals distinguish themselves from other science events through their participatory and immersive nature as well as collaborations between informal

science institutions, universities, businesses, and community groups (Bultitude *et al.* 2011; Ramsey *et al.* 2021). As the Cambridge Science Festival states, *"At most events, you'll be participating, creating, and interacting. This is not show and tell… it's show and do!"*.

Typical events at Indian science festivals include talks, expert panels, immersive workshops, interactive displays, demonstrations, guided tours, and cultural activities like theatre, music, folk arts, poetry, comedy, and magic shows. For instance, ISF has hosted a classical Indian dance performance that traced the evolution of science in the Indian subcontinent over the ages, theatre performance on emerging public health issues such as Antimicrobial Resistance and discussions that spanned India's space journey. Similarly, IISF not only showcases cutting-edge Indian R&D in space, defence and biotechnology, but also organizes science film and literature festivals. As illustrated through these examples, science festivals offer experimental platforms for creative and diverse forms of science communication and public engagement, making science more accessible and relatable.

Since English is the default language of global science, it serves as the primary mode of communication at most science festivals globally, including those in India. However, festivals are dynamic platforms that allow for live discussions, making it easier to switch between languages to engage diverse audiences more effectively and to design events specifically in local languages. For instance, festivals like IISF and *Bharatiya Vigyan Sammelan* actively engage with local scientists, educators and science communicators to organise sessions in multiple Indian languages. This multilingual approach and feature of festivals make them an accessible platform for science communication, particularly in a linguistically diverse country like India.

Another distinct feature of the science showcased at festivals is that it is often presented as a work in progress, highlighting the dynamic and evolving nature of scientific discovery. This approach contrasts sharply with the portrayal of science in educational textbooks and other educational initiatives, where it is typically depicted as a completed and definitive body of knowledge. While it is not clear how well Indian festivals are able to do this but the inclusion of emerging scientific themes

such a climate science, AI, neuroscience and so, in the festival demonstrate that they are actively engaging with the forefront of scientific inquiry.

4 The role and impact of science festivals

4.1 Enabling science communication and promotion

While science festivals in India have created valuable opportunities to promote advances in S&T, there is currently no empirical data available to assess their impact on fostering scientific literacy, increasing participation in STEM careers or on public perception of or interest in science. However, participation in these events, media coverage, and anecdotal feedback suggest that they do spark interest in science, especially among younger audiences (ISF 2023 & 2024 reports).

These festivals also provide visibility for Indian scientists and innovators, helping to connect the public, educators, and the scientific community through a wide range of interactive activities. Indian science festivals actively collaborate with media outlets, further amplifying the reach of the scientists and research showcased. Nevertheless, large-scale evaluation is necessary to fully understand the extent of their influence on promoting science among public audiences.

Moreover, Indian science festivals provide a unique platform for scientists to engage directly with public audiences through talks, demos and workshops, offering a valuable opportunity to improve their science communication skills. By interacting with non-experts in a more informal and accessible setting, scientists can practice conveying complex concepts in simpler terms, fostering a better understanding of their work among the public.

4.2 Career inspiration and intergenerational learning

Research indicates that early exposure to informal STEM education influences career decisions in STEM fields (Shin *et al.* 2016). Science festivals provide unique opportunities for children and young people to interact directly with scientists. For example, India Science Festival Reports (2023 & 2024) show that more than half of attendees surveyed had never interacted with a scientist before, highlighting the scarcity of such opportunities in India.

Moreover, exposure to role models significantly influences students' motivation and retention in STEM subjects (Tal *et al.* 2024; Shin *et al.* 2016). Therefore, by bringing together eminent scientists of diverse backgrounds (gender, caste, ethnicity, class, etc.), science festivals also play a crucial role in inspiring future scientists from both privileged as well as less privileged backgrounds and eventually making science more inclusive and diverse.

Science festivals in India are increasingly focusing on not only celebrating the achievements of women scientists but also designing events specifically aimed at engaging and inspiring girls to pursue careers in STEM fields. These efforts include mentorship programs, hands-on workshops, and interactive sessions that cater specifically to young female students, aiming to break down gender barriers and encourage greater participation of girls in science and technology. While there is no concrete data from India to show whether science festivals or events have significantly increased the number of girls entering STEM fields, anecdotal evidence indicates a positive influence.

Furthermore, science festivals, recognized as community events, attract not only young children but also their families, providing opportunities for intergenerational learning. This can reignite adults' interest in science and stimulate family discussions, embedding science within family contexts. Such dialogues enhance public understanding of science and trust in scientific institutions. Collaborations among diverse groups to present multifaceted programmes also bring new actors and groups into the science engagement fold. While Indian science festivals attract a diverse audience, they could more actively incorporate this diversity into the design of their programs, engagement strategies, and promotional efforts.

4.3 Promoting public dialogue and interdisciplinarity

Science festivals typically explore all aspects of science - from scientific advances to ethics and societal impact of research - creating unique spaces that foster unlikely interactions. For instance, they provide the public with the opportunity to voice their questions and concerns, directly influencing the mindset of scientific workers and policymakers. This interaction can lead to

more grounded research and nuanced perspectives on science and public policy issues. Additionally, these dialogues can result in more ethically and socially informed research as scientists gain deeper insights into public apprehensions and expectations. For instance, the India Science Festival 2024 hosted a debate titled ‘Will Human Intelligence Replace Artificial Intelligence?’ which allowed the audience to understand all aspects of Artificial Intelligence, particularly in the Indian context, and also participate in the discussion through polls.

Furthermore, science festivals offer rare opportunities for natural and social scientists to share the same space, facilitating interdisciplinary dialogue and collaborations that are often missing in traditional knowledge exchange settings like conferences. For example, ISF has brought together economists, psychologists, artists, policymakers, and biologists to discuss pressing topics such as consciousness, climate change and Artificial Intelligence and its social impacts, bridging gaps between disciplines and enriching the overall scientific and public discourse.

4.4 Ripple effects on ecosystems

Music, art, film, and literature festivals are rapidly growing worldwide, including in India, and have significantly impacted local economies. The Jaipur Literature Festival (JLF), since 2006, has become one of the world's largest literary events, attracting tens of thousands of visitors, including international tourists. The festival boosts local economies through increased demand for hotels, restaurants, and transportation, while also benefiting local artisans and businesses. This model has inspired similar literature festivals across the country.

While not a major objective of science festivals, they have been shown to boost local tourism and economies, making them an attractive venture for governments and the private sector alike. For example, the World Science Festival (WSF) in Brisbane drew over 700,000 attendees in four years, generating $32 million for the local economy. Indian science festivals could adopt strategies from JLF and WSF to enhance public engagement and drive economic growth by drawing large crowds and media attention, ultimately supporting local businesses, creating jobs, and fostering a cultural integration of

science. Additionally, this approach could spark the development of more regional science festivals, extending the benefits to smaller cities and communities across India.

5 Challenges and opportunities

A common criticism of science festivals, not just in India but globally, is their urban-centric nature, catering primarily to educated, English-speaking audiences already interested in science. This regional, linguistic, and cultural disconnect deprives many young people of potential scientific engagement. One way in which IISF has addressed this challenge is through its Student Science Village residential programme which enables participation of school students, particularly from rural and underserved areas, at the festival.

Additionally, activities designed for young audiences may not appeal to adults, leading to missed opportunities for broader public engagement. Balancing scale with quality is another challenge for large festivals. The diversity of a country like India means that a single event may not be culturally competent enough to be effective. Therefore, festivals must strike a balance between scale, cultural appropriateness, and engagement.

Given the socio-economic and cultural diversity in India, science festivals can greatly benefit from community participation in their design and planning stages to ensure they are relevant and meaningful to their audiences. For instance, SMASH fest UK co-designs its festival with underserved communities to align with their interests and values (Griffiths *et al.,* 2021). Successful festivals foster collaborations between informal science institutions, universities, businesses, community groups, and other organisations.

Another challenge is the lack of empirical data on the near and long-term impact of science festivals. While anecdotal evidence suggests they inspire young people and promote public engagement with science, systematic evaluation is needed to measure their effectiveness. This could involve conducting surveys, tracking participants over time, or collaborating with educational institutions to assess how festivals influence career paths and scientific engagement.

Going forward, Indian festivals should also leverage modern technologies such as virtual reality, social media, live streaming, and online forums to expand the reach of science festivals. These technologies can also help gather feedback and evaluate participation more effectively.

While current science festivals in India engage influential individuals and organizations, they have the potential to make a greater impact by shaping the broader ecosystems of science, policy, and politics. By acting as agenda-setters and influencers, these festivals can help elevate key scientific issues and priorities. Additionally, through engagement with international scientific and media communities, these festivals can draw more global attention to India's scientific talent and technological capabilities, enhancing the country's position on the world stage in research and innovation.

6 Conclusion

It is clear that the objectives and scope of public engagement with science in India have evolved from informal grassroots *Vigyan Jathas* to more organizationally-managed, urban-centric, science festivals, among other formats and channels of public engagement. Change is inevitable and it comes as no surprise that India, as a technologically and economically more advanced nation, is embracing the modern-day 'festival' format to inspire and inform young people and the public as well as showcase best of Indian science. While there continues to be space for *Vigyan Jathas* that reach people currently unreached by these modern-day festivals.

However, this shift underscores the need to continually revisit and revise our science communication and public engagement approach and strategies based on ongoing evaluation to ensure that science and research remains accessible and relevant to all segments of society. It is also important to consider whether the current number of festivals is sufficient to meet the needs of a diverse and populous country like India.

Moving forward, it is crucial to strike a balance between innovative urban events and inclusive, community-based initiatives, fostering a culture of science that truly bridges societal and social

divides. By embracing both approaches, we can create a more informed and engaged public, fostering a deeper connection with science across diverse communities in India while also positioning Indian science on a global stage.

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