



Report

On

INSA-AASSA Symposium

on

'Science Policy Futures for Asia'

*Indian National Science Academy, New Delhi
September 1-3, 2024*



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Executive Summary



The INSA-AASSA Symposium on Science Policy Futures for Asia, held from September 1–3, 2024, at the Indian National Science Academy, New Delhi, brought together policymakers, scientists and academicians to discuss Asia’s role in advancing global science policy. The event underscored the continent’s leadership in scientific innovation while addressing challenges such as equitable development, regional collaboration and integration of traditional knowledge systems with modern science. It emphasized Asia’s unique potential to blend its rich cultural heritage with cutting-edge advancements to create sustainable and inclusive solutions to pressing global challenges.

The **inaugural day** set the tone by highlighting the integration of traditional Asian knowledge systems with contemporary technologies, fostering a unique cultural-scientific synergy. Esteemed speakers, included Prof. Ashutosh Sharma, President, INSA; Prof. Narinder K Mehra Vice-President (International) INSA; Prof. Masresha Fetene (Co-President, IAP); AASSA President, Prof. Ahmet Nuri (joined the inaugural session online) and Prof. Chennupati Jagadish, President AAS & Co-Chair Advisory Council, ISC Regional Focal Point for Asia and the Pacific. They emphasized the importance of leveraging Asia’s cultural heritage in scientific advancements and seminal contributions of the continent to sustainability, ethics and inclusive innovation.

The **keynote address** was delivered by Prof. Vinod K Paul, Hon’ble Member NITI Aayog, Govt. of India who highlighted progress in the health sector and issues that need to be addressed as a joint activity of the science academies.

The **inaugural session** was addressed by two eminent speakers, both Secretaries to the Govt. of India. Dr Rajesh Gokhale, Secretary Department of Biotechnology (DBT) highlighted the Asian perspective to modern science and policy, particularly in relation to the Asian knowledge systems and philosophies. Prof. S Somanath, Secretary, Department of Space and Chairman of Indian Space Research Organization (ISRO) dwelt on the integration of ancient wisdom with cutting-edge technologies, and the unique contributions that Asian scientists can make towards global science, particularly in the context of sustainability and innovation. He also highlighted the Indian effort in space research, particularly the Indian Lunar mission for landing on the unique South Pole of the moon surface.

The **second day** focused on governance, health, and biodiversity. Sessions explored innovative governance models, particularly public-private partnerships, to scale research into practical applications and align scientific endeavours with sustainable development goals. Discussions on genomic research addressed its potential in disease elimination, such as tuberculosis, and emphasized the need for personalized medicine and multidisciplinary strategies. Another session explored the integration of scientific advancements with traditional knowledge, highlighting the importance of embedding science into Asia’s cultural ethos for sustainable growth. The conservation of megadiverse ecosystems was also discussed, emphasizing the role of education and agricultural research in promoting biodiversity and sustainable development.



The **final day** highlighted the contributions of young scientists to sustainable development and innovation in policy-making. Discussions focused on fostering youth-led initiatives, amplifying their voices in science policy dialogues, and promoting inclusivity in research and governance. The symposium concluded by emphasizing the importance of aligning scientific advancements with societal needs and leveraging public engagement to create impactful policies.

The symposium resulted in a policy brief with actionable recommendations (separately attached) including strengthening frameworks to enable public-private partnerships and aligning scientific research with sustainable development goals. It emphasized the need for investing in genomic research infrastructure, promoting policies that adapt to rapid scientific advancements, and fostering collaboration for disease elimination. The policy brief highlights integration of traditional knowledge systems with modern science as essential for preserving cultural heritage and advancing innovation. The biodiversity conservation was identified as a key area for policy focus, leveraging Asia's megadiverse ecosystems for sustainable development.

Youth-driven science policy emerged as a critical priority, with calls to establish mentorship programs and platforms for young scientists to contribute to regional and global challenges. By integrating youth-led initiatives into mainstream science policy, the symposium emphasized the need to foster innovative, sustainable solutions.



1. Introduction

Asia, a region of unparalleled cultural and linguistic diversity, is home to over two-thirds of the global population and contributes significantly to global development. With 57% of the world's GDP growth and 64% of global patent filings, Asia is emerging as a leader in science, technology, and innovation (STI). However, the continent also faces critical challenges, including climate crises, demographic shifts, rapid technological advancements, and the need for enhanced multilateral cooperation in a fractured world. These challenges underscore the importance of robust science and technology policies tailored to the unique needs of the region while fostering collaboration and inclusivity.

It is important for Asian nations to strengthen policies promoting the advancement of science and technology and expand continent's contribution to the global community. This is essential for fostering inclusive social development for sustainable economic growth and for improving the quality of life, including developments in food security, environmental sustainability, energy sufficiency, human capital, and extended healthy lifespans. The immense potential of Asian scientists is constrained by inequitable infrastructure to facilitate mutual collaboration and scientific exchanges.

In this context, the science academies of Asia can play an effective role in promoting educational and research collaborations among scientists across various countries. The overall objective is to address issues of common interest and establish long-term visions and set ambitious goals for science and technology tailored to individual needs and requirements. The mandate for science academies is to actively foster joint research collaboration and knowledge development by supporting joint research projects, expanding researcher and student exchange programs, and strengthening the science and technology network within the region.

INSA-AASSA Symposium:

To address the above issues, the Indian National Science Academy (INSA) together with support from the Association of Academies and Societies of Science in Asia (AASSA) organized a symposium on 'Science policy futures of Asia' in New Delhi from September 1-3, 2024. The symposium aimed to address shared scientific and policy challenges, create synergies through collaboration, and outline a vision for the future of science policy in Asia. Participants included science academies of Australia, Indonesia, Malaysia, Nepal and Sri Lanka. In addition, representatives from Kazakhstan joined online. Participants from Turkey and Bangladesh could not attend the meeting in-person. Complete list of the attendees is given in Annexure I.

The main objective of the symposium was to have a joint platform for in-person discussion to address the high impact and common challenges in relation to new developments in science and technology, and generate novel ideas for implementation. In addition to the inaugural session that was addressed by Government policy makers and



implementers, the meeting had five theme-based sessions, each addressing a specific sub-theme of science policy. Full program of the meeting is given in Annexure II.

Asia's potential for scientific advancement is immense but constrained by inequities in infrastructure and opportunities for collaboration. The symposium emphasized the role of science academies in bridging these gaps by fostering joint research, enhancing researcher and student exchange programs, and strengthening the STI network within the region. This collaborative approach aligns with Asia's rich traditions of interconnectedness and collective progress, offering innovative solutions to regional and global challenges.

The event also addressed the integration of traditional knowledge systems with modern science, promoting a science-culture nexus that leverages Asia's cultural heritage for sustainable development. Other key themes of the event included the role of governance in translating research into practical applications, genomic innovations for public health advancements, and biodiversity conservation through education and policy integration.

The symposium reinforced the need for Asia to lead in global science policy by harmonizing scientific innovation with societal needs. It underscored the importance of fostering inclusive growth, promoting sustainability, and empowering young scientists as key stakeholders in shaping a resilient future. By aligning traditional wisdom with modern advancements, the symposium charted a path for Asia to address the pressing challenges of today and tomorrow.

2. Session Summary:

The INSA-AASSA Symposium on "Science Policy Futures for Asia", provided a dynamic platform for discussing Asia's evolving role in global science policy. With an emphasis on blending traditional knowledge systems and modern advancements, the event spanned six thematic sessions, each chaired by eminent leaders and enriched by expert speakers, fostering a roadmap for inclusive and sustainable scientific progress. A full list of the participants and agenda are given in Annexure I & II respectively.

The scientific deliberations reinforced Asia's potential to lead in science policy by bridging cultural richness with modern scientific excellence. It emphasized the importance of collaboration, inclusivity, and aligning regional efforts with global priorities to address interconnected challenges such as climate change, public health, and economic disparities. The insights and resolutions from the symposium are poised to shape Asia's future as a global leader in scientific innovation and policy, ensuring a sustainable and inclusive future for all.



3.1 Session Highlights:

a) Keynote Address

Prof. Vinod K. Paul, Hon'ble Member of NITI Aayog, Government of India, during the inaugural day of INSA-AASSA Symposium delivered an inspiring keynote address titled: "As Scientists, We Cross Boundaries: The Whole Country is Family". Prof. Paul emphasized the collaborative spirit of science, where together we are: Creating New Science, Developing Bridges across the countries. He also highlighted the importance of translating Traditional Medicine for the modern world, a vital step in our journey towards holistic healthcare.

b) Inaugural Session

- Theme: Finding an Asian Perspective to Modern Science and Policy.
- Chair: Prof. Ashutosh Sharma (President, INSA).
- Speakers: Dr. Rajesh Gokhale (DBT Secretary) and Dr. Somanath S (ISRO Chairman).

This session explored how traditional Asian knowledge systems and philosophies can enrich modern science and policy. The panel discussed about:

- ✓ Intersections Between Historical Practices and Contemporary Innovations
- ✓ Integration of Ancient Wisdom with Cutting-Edge Technology
- ✓ Role of Cultural Heritage in Scientific Advancement
- ✓ Asia's Unique Contributions to Global Science Policy—with a focus on sustainability, ethics, and inclusive innovation.

c) Session 1

- Theme: Innovating Governance: Bridging Policy, Research, and Industry for a Resilient World.
- Chair: Prof. V. M. Tiwari (Vice President, INSA).
- Speakers: Dr. Krishna Ella (Bharat Biotech), Prof. T.G. Sitharam (AICTE), and Prof. T. Ramasami (Anna University).

The session brought together thought leaders to discuss the critical intersections of policy, research, and industry in driving India's scientific and technological advancements. The panel underscored the importance of innovative governance models in enhancing collaboration between governmental agencies, research institutions, and industry leaders, all aiming to build a resilient and self-reliant world.

d) Session 2

- Theme: Navigating the Future of Health Science: Integrating Genomic Innovations and Public Health Strategies for Disease Elimination.
- Chair: Prof. Narinder Mehra (Vice President, INSA).



- Speakers: Prof. Soumya Swaminathan (National TB Elimination Program), Dr. Shiv Sarin (NAMS), and Dr. Lyazzat Yeraliyeva (Kazakhstan).

The second session focused on Integrating Genomic Innovations and Public Health Strategies for Disease Elimination. The panel explored how genomic research, personalized medicine, and public health strategies are shaping the future of health science, with a particular emphasis on eliminating infectious diseases like tuberculosis. This session underscored the critical role of emerging technologies, multidisciplinary collaboration, and adaptive policy frameworks in driving the future of health science.

e) Session 3

- Theme: Embedding Science in the Cultural Ethos of Asia: Bridging Traditions with Innovation.
- Chair: Prof. Narinder Mehra.
- Speakers: Prof. Chennupati Jagadish (AAS) and Dr. Masresha Fetene (IAP).

This session examined how scientific advancements can be harmonized with traditional values and practices, and how indigenous knowledge systems can enrich global scientific discourse. This session highlighted the importance of bridging traditions with innovation, ensuring that scientific progress respects and incorporates cultural values.

f) Session 4

- Theme: Preserving and Harnessing Megadiverse Ecosystems: Integrating Science, Education, and Policy for Sustainable Development.
- Chair: Prof. Indranil Manna (Vice President, INSA).
- Speakers: Prof. Mamidala Jagadesh Kumar (UGC) and Prof. L.S. Shashidhara (NCBS).

Given India's status as one of the world's megadiverse countries, the panel discussed how to effectively integrate biodiversity conservation into higher education and leverage agricultural research for sustainable development. They advocated for education that promotes a sustainable and equitable world, emphasizing the decentralization of education to develop locally rooted, globally relevant solutions.

g) Session 5

- Theme: Navigating the Science-Society Nexus: Bridging Gaps and Shaping Future Frontiers.
- Chair: Prof. L.S. Shashidhara
- Speakers: Dr. Rupert Ian Lewis (Royal Society) and Prof. Ambuj Sagar (IIT Delhi).

This session underscored the need for a more inclusive and impactful dialogue between science and society, as well as the strategies required to bridge gaps and shape future frontiers at this intersection.



h) Session 6

- Theme: Youth-Driven Science and Policy Innovations for a Sustainable Future.
- Chair: Prof. Ashutosh Sharma.
- Speakers: Dr. Praveen K. Somasundaram (DST), Prof. Chandrashekhar Sharma (IIT Hyderabad), Prof. Nishant
- Chakraborty (INIAS), Dr. Neetu Singh (IIT Delhi), and Dr. Veda Krishnan (ICAR).

The session spotlighted how the next generation is tackling global challenges through innovative approaches. This session spotlighted the innovative contributions of youth in science and policy-making and the importance of mentorship and supportive strategies to amplify their voices.

The insights gathered from the six sessions provided a strong foundation for exploring critical aspects of Asia's Policy & STI Landscape, addressing Challenges, envisioning Policy Futures, and formulating actionable Recommendations.

The Policy & STI Landscape Assessment revealed Asia's dynamic innovation ecosystems shaped by mission-oriented policies, while also identifying gaps like inequities in infrastructure and collaboration.

The symposium underscored these challenges, focusing on issues such as limited public-private partnerships, fragmented regional governance, and demographic pressures. The discussions seamlessly transitioned into identifying solutions through Policy Futures, advocating for societal-challenge-driven science, participatory policymaking, and ethical AI integration.

The culmination of the symposium provided a blueprint for strategic actions, emphasizing regional cooperation, youth empowerment, and sustainability-driven policies. These Recommendations aim to harmonize traditional wisdom with cutting-edge innovation, strengthen regional STI networks, and align efforts with global priorities, ensuring Asia's leadership in addressing pressing challenges.



3. Glimpses of INSA-AASSA Symposium





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HEALTH
POLICY
the interacademy partnership



aassa
THE ASSOCIATION OF ACADEMIES
AND SOCIETIES OF SCIENCES IN
Asia





Acknowledgement

This report is the result of the discussions and deliberations held during the AASSA-INSA Symposium on '*Science Policy Futures for Asia*', organized by the Indian National Science Academy (INSA) in New Delhi, India, from September 1 to 3, 2024.

INSA expresses its profound gratitude to the Association of Academies and Societies of Sciences in Asia (AASSA) and the InterAcademy Partnership (IAP) for their unwavering support in facilitating this significant event. We extend our heartfelt thanks to the distinguished experts and participants for their invaluable contributions, insights, and perspectives, which greatly enriched the outcomes documented in this report.

We also sincerely acknowledge the Department of Science & Technology (DST) for facilitating the travel and logistical arrangements for our international participants, as well as the Department of Biotechnology and the Department of Atomic Energy for their active participation in the discussions.

A special thanks to Prof. Vinod Paul for his inspiring keynote address, which set the tone for meaningful and impactful deliberations during the Symposium.

Our heartfelt appreciation is also extended to Ms. Hanseul Kim, AASSA Secretariat, for her unwavering help and support throughout the planning and execution of this event.

Contributors:

We extend our deepest gratitude to Prof. Narinder K. Mehra for his invaluable guidance and contributions that were instrumental in shaping the discussions and outcomes of this report.

Special thanks to Pranav Sharma, Nidhi Shrivastava, Atri Mallick, and Fahmida Khan for their exemplary efforts and significant contributions to the development of this report.



Science Policy Futures of Asia

INSA-AASSA POLICY BRIEF



INSA-Centre for Science & Technology Policy

2024

Introduction

The 21st century has witnessed an unprecedented growth in technological innovation globally that has significantly contributed to the reshaping of economies, societies, and the environment at an extraordinary scale. Nowhere is this transformation more pronounced than in Asia where economies and societies are in a contrasting state between technological adaptations and technological dominance as the region becomes more and more characterized by its diversity, rapid economic growth, and evolving geopolitical influence. Technology, science, and innovation (TSI) have emerged as critical tools for addressing the region's most pressing challenges, from climate change and public health crises to economic disparities and digital divides. At the time when Asian nations struggle to navigate these complexities, the need for cohesive and forward-looking TSI policies has become more urgent than ever.

The TSI landscape in Asia is both dynamic and uneven. While East Asia has attained robust research ecosystems and strategic investments and therefore has built a global leadership in areas such as artificial intelligence, quantum computing, and renewable energy, Southeast and South Asia present a more uneven landscape, where progress in TSI remains tempered by resource constraints, institutional fragmentation, and significant disparities in technological capacity, and Central Asia, often overlooked in TIS discourse, is transitioning from resource-driven economies toward knowledge-based models with varying degrees of institutional readiness. These stark disparities underscore not only the diverse trajectories of TSI development as both state-led and private developmental project across the continent but also reflects a mix of historical and cultural legacies that keep revisiting the nation-states as they comprehend complex socio-economic conditions within the state's statutory limits and broadly in the region. The lack of discourse on synergetic policy frameworks within the subsets or the region as a whole enunciate the discord.

This brief explores the evolution of TSI policies in Asia, examining how they have been shaped by regional and global forces and how they might evolve to meet future challenges. It critically analyses the theoretical underpinnings of these policies—drawing on concepts such as path dependency and institutionalism—and highlights their successes and limitations in promoting innovation, a more pronounced and citizen centric developmental tool. The discussion then turns to the future, envisioning potential trajectories for TSI governance in Asia that prioritize inclusivity, sustainability, and resilience as we emphasise that the role of TSI in Asia is not merely a matter of economic growth; it is integral to the region's ability to address societal and environmental imperatives. Given region's cultural diversity and enormous indigenous knowledge that still plays an active part in the hegemonic order of state thinking, the need for integration of indigenous knowledge systems into policy frameworks becomes central to the region's policy discourse. As we imagine science policy futures, Asian nations might have the opportunity design a framework that balances technological advancement with equitable development that helps all regional partners and creates an environment of mutual trust and cooperation.

Asian Science Policy Landscape

The TSI policy landscape in Asia, has, over the years, been influenced by historical and traditional intricacies, dynamics of regional geopolitics, and much more by the region's socioeconomic heterogeneity. Over past few decades, with technological fervour guiding western developmental enterprise, the region has also responded quite enthusiastically to the west induced economic modernisation and free market competition as far as adapting and importing TSI is concerned. Some nation-states have been able to become manufacturing states not only for the region but also for global markets. Having said that, the trajectories and outcomes of TSI in pure forms or in policy mandates, differ widely.

The evolution of TSI policies in Asia reflects key theoretical paradigms in policy studies, notably path dependency and institutionalism. Historical trajectories, such as Japan's industrial policies and post-war technological rebuilding, continue to shape its focus on robotics and automation, particularly in response to demographic challenges. Similarly, China's strategic pivot toward technological self-reliance, codified in its "Made in China 2025" initiative, aligns with neo-mercantilism principles, emphasizing state-led innovation to mitigate dependence on foreign technology and bolster economic sovereignty. India, as a transitioning economy, pays much emphasis on translatable science and encourages innovation that can lead to enhancement of manufacturing capacities. In emerging economies like Bangladesh and Uzbekistan, TSI policies are predominantly shaped by external pressures, such as globalization and international aid frameworks, which often prioritize integration into global value chains and alignment with donor-driven agenda.

Despite the diverse contexts, a common challenge across the region is the translation of ambitious TSI policies into inclusive and sustainable outcomes. For instance, while countries like Singapore and South Korea showcase exemplary models of urban innovation and digital transformation, significant digital divides persist within and across nations. In India, for example, the Digital India initiative has made strides in expanding digital infrastructure, yet rural populations remain underserved, highlighting systemic inequities primarily because of the extraordinarily disparate resource to population dependency ratio. The overemphasis on high-tech innovation, such as AI and biotechnology, risks sidelining critical investments in technologies that directly address basic needs, such as clean water, affordable energy, and public health.

The role of TSI policies in fostering regional and global integration becomes particularly pronounced in Asia, where several initiatives attempting to bridge state efforts with regional priorities through collaboration representing valuable platforms for resource sharing and transboundary problem-solving, often fall short of their potential due to disparities in institutional capacities and inconsistent implementation across member states. Moreover, geopolitical tensions, such as those between major powers in the region, complicate efforts to build trust and foster deeper TSI cooperation.

From a functional perspective, Asia's TSI landscape reveals systemic strengths and structural weaknesses. High-income nations in East Asia benefit from advanced R&D ecosystems, effective public-private partnerships, and a strong culture of innovation. Conversely, lower-income and emerging economies face persistent challenges, including limited fiscal space for R&D, weak intellectual property regimes, and underdeveloped innovation systems. These disparities are

further exacerbated by reliance on foreign funding and expertise, leaving many nations vulnerable to external shocks and geopolitical volatility. Therefore, TSI policy evolution in Asia becomes a compelling case of how nation-states navigate the tension between national sovereignty and global interdependence. For instance, nations like China and India are increasingly seeking technological sovereignty through large-scale domestic investments, while simultaneously engaging in global partnerships and competition. This duality reflects a complex balancing act: leveraging globalization's benefits while mitigating its vulnerabilities.

As we can see, the TSI policy landscape in Asia highlights the urgent need for recalibration. Policymakers must broaden their focus beyond economic competitiveness to consider the societal and environmental dimensions of innovation and the long-term impact of creating the much-emphasised digital infrastructure. This includes addressing inequities in access to technology, promoting inclusive participation in the innovation process, and ensuring that technological advancements align with ethical and sustainability principles. Achieving this recalibration will require a paradigmatic shift in how success is measured, moving away from narrow metrics such as R&D spending and patent filings to more holistic indicators of societal well-being and ecological balance.

Science Policy Futures: Exploring Trajectories for Asia

The deliberation for science policy futures for Asia present an opportunity to reimagine the role of innovation in addressing the region's most pressing challenges while shaping a more equitable and sustainable trajectory for technological progress. Given crucial position in global economic prosperity and progress, its future policies must also go beyond driving economic growth; they must integrate societal needs, environmental imperatives, and ethical considerations. Central to this vision is the need to address the region's immense diversity and disparities, ensuring that scientific innovation benefits all segments of society. Future science policies could emphasize inclusivity by focusing on technologies that bridge gaps in healthcare, education, and infrastructure, especially in underrepresented and rural areas. At the same time, furthering resilience to global uncertainties—such as climate change, pandemics, and geopolitical shifts—should become a cornerstone of these strategies. For instance, policies could prioritize investments in climate adaptation technologies, renewable energy systems, and precision agriculture to ensure food and water security in the face of environmental stressors.

In order to realise these futures, governance models must evolve. Traditional, top-down approaches to policymaking need to be complemented by frameworks that are adaptive, participatory, and anticipatory. Anticipatory governance that has become an essential part of European policy discourse, involves scanning for emerging trends and preparing for disruptive changes, could help navigate the uncertainties of rapid technological convergence, such as the societal impacts of artificial intelligence or genetic engineering. Participatory models can democratise the process that can encourage citizen led TSI development and deployment, bringing in voices from marginalised communities, industry, academia, and civil society to co-create solutions that reflect the region's diverse cultural and social realities.

The need for regional cooperation is the most critical factor in maximising shared opportunities and addressing transborder challenges. Enhanced platforms for collaboration—such as open data ecosystems, energy technology sharing, and joint research programs—could position Asia as a global leader in tackling complex, interconnected problems. For instance, expanding ASEAN's science and technology frameworks to include deeper commitments to knowledge exchange and innovation networks could foster collective resilience and reduce duplication of efforts.

This brings us to the fact that redefining success is also pivotal. Metrics such as R&D spending or patent filings, while important, are insufficient to capture the societal impact of science but fail to comprehend the ecosystem holistically. Therefore, science policy futures must adopt a more holistic approach, assessing outcomes such as social equity, long-term environmental sustainability, and ethical adherence. This recalibration is not only a moral imperative but also a practical one; as the region's populations struggle with growing inequality and environmental vulnerability, innovation systems that fail to align with broader human and ecological needs risk undermining their own long-term viability. Science policy futures for Asia, therefore, demand a shift in mindset—from viewing science and technology as ends in themselves to recognizing them as tools for building a more inclusive and sustainable future.

At its heart, the interface between science and policy is not merely instrumental but deeply epistemological and ethical. Science seeks to uncover truths about the natural world through systematic inquiry, while policy represents the translation of collective values into actionable

frameworks. The alignment of these domains demands a nuanced approach that reconciles empirical insights with normative aspirations. In Asia, this reconciliation takes on unique forms shaped by the region's philosophical traditions, developmental trajectories, and global positioning.

Therefore, some science policy futures that could be contextually relevant to Asia could be as follows:

Societal-Challenge-Driven Science

A prominent vision for Asia's science policy future would involve aligning research and innovation with societal challenges such as climate change, public health crises, and sustainable development. In the wake of automated manufacturing processes, it would be essential to balance technological infrastructure mindfully with the nation-state's labour (skilled and unskilled) workforce. Given immense population pressures of the region, this approach may tangentially seem economically welfarist, however may become essential forcing an urgent political response. As this approach resonates with Asian philosophical traditions emphasizing harmony between humanity and nature, it would help position science as a tool for holistic well-being. Governments across the region could adopt mission-oriented frameworks, directing research towards solving specific problems through integrative strategies that could encompass indigenous and traditional knowledge in tandem with modern science. However, this approach carries risks. Balancing short-term policy goals with the long-term nature of scientific inquiry could generate tension, while prioritizing certain challenges over others may exacerbate inequalities within and among nations, given Asia's socio-economic diversity.

Participatory Science and Policy

Given considerable disassociation between public and science, despite technology being exploited beyond measure, a participatory approach to science policy offers may offer a pathway with high levels of public engagement in setting research agendas and policy directions. Rooted in the principles of democratic governance and collective decision-making, this model transforms citizens from passive recipients of science into active contributors to the innovation ecosystem. While referendums may be avoided, a vast consultation network that involves various stakeholders, majority form the public space, would help create such a governance model. Mechanisms such as citizen science, public consultations, and deliberative forums could enhance inclusivity, ensuring that policies reflect diverse societal needs. Yet, achieving this vision is fraught with challenges. Managing conflicting stakeholder interests, safeguarding the integrity of scientific inquiry, and preventing the co-optation of participatory processes by powerful interest groups will require robust institutional frameworks and vigilant oversight.

Data-Driven Science and AI

Integration of data-driven science and artificial intelligence (AI) into policymaking may help create a technologically advanced future for Asia by leveraging big data analytics and predictive models, governments could enhance decision-making precision and efficiency. This would align with several Asian nation-state's emphasis on order and governance efficiency, yet it also raises profound ethical and philosophical concerns. The objectivity of data often masks underlying biases, while the opaque nature of AI algorithms as they become dense and beyond sensible scrutiny over time risks transparency and accountability of the system. Scholarship has been

divided on the dissolution of grey margins of regulation and governance of people, while it may seem an objective technologically driven future, a computation driven legal system is not designed to overlook fine distinctions, and hence cannot make a discretionary judgement. Therefore, ensuring that these technologies are deployed responsibly, equitably, and ethically will be essential, particularly in a region where trust in state institutions varies widely. Striking a balance between data-driven efficiency and normative considerations will require a recalibration of governance processes, with an emphasis on algorithmic accountability by creating human discretionary loops in the systems and creating an environment for inclusive policymaking not only within state's statutory boundaries but also in the regions with an emphasis on transboundary sharing of best practices.

Open Science and Global Collaboration

Open science and enhanced global collaboration would position Asia as a key player in addressing transboundary challenges such as climate change, public health, energy, and many such areas by fostering transparency and minimizing barriers to knowledge sharing. This would help the region create modern traditions of interconnectedness and mutual responsibility in addition to the historical ones. Open science initiatives, bolstered by international partnerships, could drive breakthroughs in innovation and collective action. However, such an approach could also present risks, including potential exploitation by powerful actors and unequal distribution of benefits. Intellectual property disputes and capacity disparities could undermine the ethos of collaboration, necessitating equitable frameworks for participation and benefit-sharing.

Industrial Policy and Science

Aligning science policy closely with industrial policy may reflect a pragmatic and economically driven approach, leveraging science as a tool for competitiveness, reminiscent of state-led development strategies historically prominent in many Asian nation-states. While effective in promoting industrial expansion and growth, and, of course, technological leadership, this approach risks narrowing the scope of scientific inquiry, privileging economic objectives over societal and most importantly environmental considerations. Moreover, the alignment of science with corporate interests could concentrate power within large economic actors, eroding public trust and potentially sidelining the broader public interest. Addressing these risks will require safeguards that ensure science policy remains inclusive, democratic, and responsive to societal needs.

As can be seen, no scenario is a perfect match for regional interests and cooperative development but they give a broad landscape to dynamically carve a path for Asia as a whole and in subsets. In the next section we recommend some key policy interventions for the region that may benefit a large populace of the Asian continent.

Policy Recommendations for Strengthening Science Policy Futures in Asia

- 1. Adopt Mission-Oriented Research Frameworks**

Governments could implement mission-oriented science policies that align national research efforts with pressing societal challenges such as climate change, public health, and sustainable development. This requires allocating dedicated fiscal investment to multi-disciplinary research initiatives that address these challenges, while ensuring the integration of traditional and indigenous knowledge systems into scientific frameworks. Establishing clear, measurable objectives for these missions can help maintain focus and accountability, fostering impactful outcomes.
- 2. Institutionalize Participatory Science Governance**

Asian nations could develop institutional frameworks to enhance public participation in science policymaking. Mechanisms such as citizen suggestion portals, open consultations, and community-led science initiatives can democratise the state's research agenda. These frameworks must ensure inclusivity, giving marginalized communities a voice in the decision-making process, and should incorporate safeguards to prevent the dominance of powerful interest groups. Capacity-building programs can further empower citizens to engage meaningfully in these processes.
- 3. Strengthen Ethical and Regulatory Oversight for AI and Data-Driven Technologies**

To address the challenges posed by AI and big data, Asian governments must establish robust regulatory frameworks that emphasize transparency, accountability, and equity in the deployment of these technologies. This includes mandating algorithmic audits, promoting open data policies with privacy protections, and creating interdisciplinary advisory councils to evaluate the societal impacts of AI-driven policy tools. A regional code of ethics for AI governance could also harmonize standards and promote trust in these technologies.
- 4. Expand Regional Collaboration and Open Science Initiatives**

Regional institutions such as ASEAN and SAARC could prioritize policies that promote open science and collaborative research to tackle transboundary challenges. Establishing regional data-sharing platforms, joint research and startup funds, and open-access repositories can facilitate knowledge exchange and innovation. Special emphasis should be placed on capacity-building programs for low- and middle-income countries to ensure equitable participation and benefit-sharing across the region.
- 5. Integrate TSI with National Development Goals through Holistic Metrics**

Policymakers should align TSI policies with broader national development objectives by adopting holistic success metrics. These should go beyond traditional indicators like R&D expenditures and patent counts, incorporating measures of societal impact, environmental sustainability, and inclusivity. National TSI councils could periodically evaluate progress against these metrics, ensuring that science policy remains responsive to societal needs and aligned with long-term developmental goals.

Authors

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Acknowledgements

This policy brief is an outcome of the deliberations held during AASSA-INSA Symposium on ‘Science Policy Futures of Asia’ held at the Indian National Science Academy, New Delhi, India on 1-3, September, 2024. The authors are grateful to Association of Academies and Societies of Sciences in Asia (AASSA) and InterAcademy Partnership (IAP) for their unwavering support, the experts who participated in the Symposium for the discussion and perspective they provided, and Nidhi Shrivastava, Fahmida Khan, and INSA-Centre for Science & Technology Policy for the policy research they provided and helped shape the brief.

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Annexure-I

List of Participants

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Academy of Sciences Malaysia (ASM) Fellow
- 6. Prof. Dilip Subba**
Vice Chancellor
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- 7. Dr Ranjith Mahindapala#**
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- 8. Prof. Sagarika Ekanayake**
Senior Professor
National Academy of Sciences of Sri Lanka (NASSL)
- 9. Prof. Muzaffer Şeker***
President
Turkish Academy of Sciences (TÜBA)
- 10. Prof. Mehmet Akif Kireççi***
President of ECO Educational Institute and
Member of TÜBA International Relations Working Grp
Turkish Academy of Sciences (TÜBA)



AASSA Secretariat

- 1. Dr. Ahmet Nuri Yurdusev#**
Acting President
AASSA
- 2. Ms. Hanseul Kim**
AASSA Secretariat

IAP Secretariat

- 1. Dr. Masresha Fetene**
President & Co-chair
Inter Academy Partnership

Guest Academy- The Royal Society, UK

- 1. Dr Rupert Lewis**
Chief Science Policy Officer
The Royal Society, UK
- 2. Ms Laura Penelope Jennifer Wilton**
Head of International Affairs - Europe and Asia
The Royal Society, UK

National Academy of Medical Sciences (NAMS)

- 1. Prof Shiv Sarin**
Director,
Institute of Liver and Biliary Sciences (ILBS) and
President, National Academy of Medical Sciences (NAMS)

Ministry of Science & Technology, Govt. of India (MoST)

- 1. Dr Praveen Somasundaram**
Head, International Cooperation Division
Department of Science and Technology
New Delhi

INYAS – Indian National Young Academy of Science

Dr Nishant Chakravorty
School of Medical Science and Technology, IIT Kharagpur &
Chairman INYAS & IAP Young Physician Leader

GYA – Global Young Academy

Dr Veda Krishnan
Senior Scientist
Division of Biochemistry,
ICAR- Indian Agricultural Research Institute, New Delhi



Distinguished Experts/Speakers from India

- 1. Professor Ashutosh Sharma**
President, INSA
Institute Chair Professor
- 2. Professor Indranil Manna**
INSA Vice-President
(Science and Society)
- 3. Professor Narinder Kumar Mehra**
INSA Vice-President
(International Affairs)
- 4. Professor Sanjay Puri**
Vice-President
(Resource Generation and Management)
- 5. Dr Virendra Mani Tiwari**
INSA Vice-President
(Publications / Informatics)
- 6. Dr Rajesh S. Gokhale**
Secretary
Department of Biotechnology, Govt. of India
- 7. Dr Vinod K Paul**
Hon'ble Member,
NITI Aayog, Govt. of India
- 8. Dr SP Somanath**
Chairman
Indian Space Research Organisation (ISRO) &
Department of Space (DoS)
Bengaluru
- 9. Prof. Mamidala Jagadesh Kumar**
Chairman,
University Grant Commission (UGC)
New Delhi
- 10. Dr Krishna M Ella**
Co-Founder and Executive Chairman
Bharat Biotech International Limited
Hyderabad-500078
- 11. Prof. K VijayRaghavan#**



Emeritus Professor & Former Director,
National Centre for Biological Sciences
Bengaluru

12. Prof. Ambuj Sagar

Founding Head,
School of Public Policy &
Vipula and Mahesh Chaturvedi Professor of Policy Studies,
IIT Delhi

13. Prof. Soumya Swaminathan

Principle Advisor
Union Ministry of Health & Family Welfare for the National Tuberculosis Elimination
Programme

14. Prof. T G. Sitharam

Chairman
All India Council for Technical Education (AICTE), New Delhi

15. Prof. L. S Shashidhara

Director
National Centre for Biological Sciences (TIFR-NCBS)
Bengaluru

16. Dr Neetu Singh

Assistant Professor
Centre for Biomedical Engineering
Indian Institute of Technology (IIT), Delhi &
INSA Associate Fellow (IAF)

INSA Organising Team

1. Dr Brajesh Pandey

Executive Director
Indian National Science Academy

2. Mr Sunil Zokarkar

Deputy Executive Director-I
Indian National Science Academy

3. Dr Brotati Chattopadhyay

Assistant Executive Director-I
Indian National Science Academy

4. Mr Pranav Sharma

Consultant (Science Policy)
Indian National Science Academy

5. Dr Nidhi Shrivastava



Project Scientist
Indian National Science Academy

6. **Mr Atri Mallick**
Project Associate (Scientific)
Indian National Science Academy
7. **Ms Famida Khan**
Senior Project Associate
Indian National Science Academy
8. **Ms Shiwangi Gupta**
Senior Project Associate
Indian National Science Academy
9. **Ms Ananya Banerjee**
Project Assistant
INYAS

#- Online Participation

*-Could not attended the Symposium



INSA-AASSA Symposium
on
'Science Policy Futures for Asia'
Indian National Science Academy, New Delhi
September 1-3, 2024

1 September 2024, Day 1 Venue: Multipurpose Hall, Indian National Science Academy	
1715 Hrs – 1730 Hrs	Traditional Welcome at INSA
1730 Hrs – 1800 Hrs	Registration
1800 Hrs – 1810 Hrs	Welcome Address Prof Ashutosh Sharma President, Indian National Science Academy
1810 Hrs – 1820 Hrs	Workshop Orientation & Agenda Summary Prof Narinder K Mehra Vice President (International), INSA
1810 Hrs – 1815 Hrs	Address by IAP Chair Prof Masresha Fetene Co-President, IAP
1815 Hrs – 1840 Hrs	Keynote Address by Prof. Vinod K Paul Hon'ble Member NITI Aayog Govt. of India
1840 Hrs – 1845 Hrs	Address on behalf of ISC Prof Chennupati Jagadish President AAS & Co-Chair Advisory Council, ISC Regional Focal Point for Asia and the Pacific
1845 Hrs – 1850 Hrs	Address by AASSA Chair Prof Ahmet Nuri Yurdusev President, AASSA
1850 Hrs – 1900 Hrs	<p>Introduction of Representatives from AASSA Member Academies (5min each)</p> <ul style="list-style-type: none">○ Prof Chennupati Jagadish, President Australian Academy of Sciences○ Dr Brotati Chattopadhyay, Assistant Executive Director, International Division, Indian National Science Academy○ Dr Finarya Legoh, Head, Indonesian Academy of Sciences (AIPI) International Relation & Funding Bureau, Indonesia○ Dr Lyazzat Yeraliyeva, Vice President, National Academy of Sciences, Republic of Kazakhstan○ Prof. Mahendhiran Sanggaran Nair, Academy of Sciences Malaysia



	<p>(ASM) Fellow, Malaysia</p> <ul style="list-style-type: none">○ Prof. Dilip Subba, Vice Chancellor of Nepal Academy of Science & Technology (NAST), Nepal○ Prof. Sagarika Ekanayake, National Academy of Sciences of Sri Lanka (NASSL), Sri Lanka○ Dr Ranjith Mahindapala, National Academy of Sciences of Sri Lanka (NASSL), Sri Lanka○ Prof. Muzaffer Şeker, President, Turkish Academy of Sciences (TÜBA), Turkey○ Prof. Mehmet Akif Kireçci, Member of Turkish Academy of Sciences (TÜBA) International Relations, Turkey○ Dr Rupert Ian Lewis, Chief Science Policy Officer, Royal Society, United Kingdom○ Dr Laura Wilton, Royal Society, Head of International Affairs - Europe and Asia, United Kingdom○ Ms Hanseul Kim, AASSA Secretariat
1900 Hrs – 1950 Hrs	<p>Inaugural Session: Finding an Asian perspective to modern science and policy; and where do the intersections of the past and future exist? : The panel will explore how traditional Asian knowledge systems and philosophies can contribute to modern science and policy. It will focus on the intersections between historical practices and contemporary innovations, highlighting how these perspectives can shape future global developments. Experts will discuss the integration of ancient wisdom with cutting-edge technology, the role of cultural heritage in scientific advancement, and the unique contributions Asia can offer to global science policy, especially in the context of sustainability, ethics, and inclusive innovation.</p> <p>Chair: Prof. Ashutosh Sharma, President, Indian National Science Academy</p> <p>Speakers:</p> <ul style="list-style-type: none">○ Dr Rajesh Gokhale, Secretary, Department of Biotechnology (DBT), Ministry of Science & Technology, Govt. of India○ Dr Somanath S, Secretary, Department of Space (DOS) / Chairman, Indian Space Research Organisation (ISRO), Govt. of India
1950 Hrs – 1955 Hrs	Vote of Thanks Dr Brajesh Pandey , Executive Director, INSA
2000 Hrs Onwards	Welcome Dinner at INSA

2 September 2024, Day 2



Venue: INSA (Multipurpose Hall)	
0900 Hrs – 0910 Hrs	About INSA and its Policy Aspirations Prof. Narinder K Mehra Vice President, INSA
0910 Hrs – 1040 Hrs	Session 1: Innovating Governance: Bridging Policy, Research, and Industry for a Resilient World: The panel will explore the critical intersections of policy, research, and industry in driving India's scientific and technological advancements. The discussion will focus on how innovative governance models can enhance collaboration between governmental agencies, research institutions, and industry leaders to build a resilient and self-reliant nation. Key areas of discussion will include policy frameworks for fostering innovation, the role of public-private partnerships in scaling research outcomes, and the governance challenges in aligning scientific progress with sustainable development goals. Chair: Prof. V M Tiwari , Vice President, INSA Speakers: <ul style="list-style-type: none">○ Dr Krishna Ella, Executive Chairman, Bharat Biotech International Limited○ Prof. T G Sitharam, Chairman, All India Council for Technical Education (AICTE), New Delhi○ Prof T Ramasami, Distinguished Professor of Eminence, Anna University, Chennai Discussion - 20 Minutes
1040 Hrs – 1100 Hrs	Tea/Coffee Break
1100 Hrs – 1300 Hrs	Session 2: Navigating the Future of Health Science: Integrating Genomic Innovations and Public Health Strategies for Disease Elimination: The panel will explore the intersection of genomic research, personalised medicine, and public health strategies in shaping the future of health science, particularly focussing on the elimination of infectious diseases like tuberculosis. The discussion will delve into the role of emerging technologies, the importance of multi-disciplinary collaboration, and the need for policy frameworks that can support rapid adaptation to scientific advancements. Chair: Prof. Narinder K Mehra , Vice President, INSA Speakers: <ul style="list-style-type: none">○ Dr Soumya Swaminathan, Principal Advisor, National Tuberculosis Elimination Program, Ministry of Health & Family Welfare, GoI○ Dr Shiv Sarin, President, National Academy of Medical Sciences○ Dr Lyazzat Yeraliyeva, Vice President, National Academy of Sciences, Republic of Kazakhstan○ Prof. Mahendhiran Sanggaran Nair, Academy of Sciences Malaysia



	<p>(ASM) Fellow, Malaysia</p> <ul style="list-style-type: none"> ○ Prof. Sagarika Ekanayake, National Academy of Sciences of Sri Lanka (NASSL), Sri Lanka <p>Discussion - 20 Minutes</p>
1300 Hrs – 1400 Hrs	Lunch
1400 Hrs – 1530 Hrs	<p>Session 3: Embedding Science in the Cultural Ethos of Asia: Bridging Traditions with Innovation: The panel will explore the intersection of science and cultural heritage in Asia, examining how scientific advancements can be harmonised with traditional values and practices. It will also delve into how indigenous knowledge systems can contribute to global scientific discourse and the role of public policy in fostering a science-culture nexus.</p> <p>Chair: Prof. Narinder Mehra, Vice President (International), INSA</p> <p>Speakers:</p> <ul style="list-style-type: none"> ○ Prof Chennupati Jagadish, President Australian Academy of Sciences & Co-Chair Advisory Council, International Science Council Regional Focal Point for Asia and the Pacific ○ Dr Masresha Fetene, President & Co-chair, Inter Academy Partnership <p>Discussion - 20 Minutes</p>
1530 Hrs – 1630 Hrs	<p>Deliberations by Participating Representatives from AASSA Member Academies (10 min each)</p> <p>Chair: Prof. Sanjay Puri, Vice President, INSA</p> <ul style="list-style-type: none"> ○ Dr Finarya Legoh, Head, Indonesian Academy of Sciences (AIPI) International Relation & Funding Bureau, Indonesia ○ Prof. Dilip Subba, Vice Chancellor of Nepal Academy of Science & Technology (NAST), Nepal ○ Dr Ranjith Mahindapala, National Academy of Sciences of Sri Lanka (NASSL), Sri Lanka
1630 Hrs – 1700 Hrs	Tea/ Coffee Break
1700 Hrs – 1830 Hrs	<p>Session 4: Preserving and Harnessing Megadiverse Ecosystems: Integrating Science, Education, and Policy for Sustainable Development: The panel will explore the intersection of science, education, and policy in the conservation and sustainable use of megadiverse ecosystems. With India being one of the world's megadiverse countries, the panellists will discuss strategies to integrate biodiversity conservation into higher education, leverage agricultural research for sustainable development, and promote cutting-edge biological research. The discussion will focus on collaborative efforts to preserve these ecosystems while ensuring their benefits are harnessed for economic and social development in line with global sustainability goals.</p>



	<p>Chair: Prof. Indranil Manna, Vice President, INSA</p> <p>Speakers:</p> <ul style="list-style-type: none">○ Prof. Mamidala Jagadesh Kumar, Chairman, University Grant Commission (UGC),○ Prof. L S Shashidhara, Centre Director, National Centre for Biological Sciences (NCBS), Bengaluru <p>Discussion - 20 Minutes</p>
1830 Hrs – 2000 Hrs	Return to Hotel Executive Time
2000 Hrs onwards	Symposium Dinner at Hotel Lalit

3 September 2024, Day 3

Venue: Multipurpose Hall (Indian National Science Academy)

0900 Hrs – 1100 Hrs	<p>Session 5: Navigating the Science-Society Nexus: Bridging Gaps and Shaping Future Frontiers: The panel will explore the intricate relationship between science and society, focussing on how scientific advancements can be more effectively integrated into societal development. The discussion will delve into the challenges and opportunities at the intersection of science and society, highlighting the roles of policy, technology, and public engagement. The panellists, with their diverse expertise in science policy, health science, and translational research, will provide insights into the current crossroads where science meets societal needs, and discuss strategies for fostering a more inclusive and impactful science-society dialogue.</p> <p>Chair: Prof L S Shashidhara, Centre Director, National Centre for Biological Sciences (NCBS), Bengaluru</p> <p>Speakers:</p> <ul style="list-style-type: none">○ Dr Rupert Ian Lewis, Chief Science Policy Officer, Royal Society, United Kingdom○ Dr Ambuj Sagar, Founding Head, School of Public Policy, Indian Institute of Technology (IIT) Delhi <p>Discussion - 20 Minutes</p> <p>Keynote: Asia and Multilateralism: Shaping the Future of Global Science and Innovation Diplomacy Prof K Vijayraghavan, Former Principal Scientific Advisor to Govt of India (20 Min)</p>
1100 Hrs – 1130 Hrs	Tea Break



1130 Hrs – 1300 Hrs	<p>Session 6: Youth-Driven Science and Policy Innovations for a Sustainable Future: The panel could explore how young scientists and policymakers are contributing to sustainable development, addressing global challenges, and shaping the future through innovative approaches. It would highlight case studies, mentorship programs, and strategies to amplify youth voices in science and policy-making.</p> <p>Chair: Prof. Ashutosh Sharma, President, INSA</p> <p>Speakers (10 minutes each):</p> <ul style="list-style-type: none">o Dr Praveen K Somasundaram, Head, International Division, Department of Science & Technologyo Prof Chandrashekhara Sharma, Indian Institute of Technology (IIT) Hyderabad, (Global Young Academy-GYA/Indian National Young Academy of Sciences-INYAS)o Prof Nishant Chakraborty, Chairman, Indian National Young Academy of Sciences-INYAS)o Dr Neetu Singh, Professor, Centre for Biomedical Engineering, Indian Institute of Technology (IIT) & INSA Associate Fellowo Dr Veda Krishnan, Senior Scientist, Division of Biochemistry, ICAR- Indian Agricultural Research Institute, New Delhi & INSA Young Associate fellow
1300 Hrs - 1330 Hrs	<p>Closing Session</p> <p>Prof. Ashutosh Sharma, President, INSA Prof. Narinder Mehra, Vice President (International), INSA</p>
1330 Hrs - 1430 Hrs	<p>Lunch</p>
1500 Hrs – 1700 Hrs	<p>Guided Tour of Pradhanmantri Sangrahalaya*, PMML, Teen Murti Bhavan</p>
<p>End of the Conference</p>	