



# YOJANA

G20  
भारत 2023  
भारत गुरुकुल

75  
Azadi Ka  
Amrit Mahotsav

NOVEMBER 2023

A DEVELOPMENT MONTHLY



# G20

भारत 2023 INDIA

वसुधैव कुटुम्बकम्

ONE EARTH • ONE FAMILY • ONE FUTURE

## LEAD ARTICLE

**G20 : FOR THE PLANET,  
PEOPLE, PEACE AND  
PROSPERITY**

AMITABH KANT

## SPECIAL ARTICLE

**INDIA'S RISING INFLUENCE:  
G20 SUMMIT PUTS INDIA  
ON THE WORLD STAGE**

HARSH VARDHAN SHRINGLA



Let noble thoughts come to us from all sides.  
Rig Veda

CHIEF EDITOR  
**MANOJYAN RANI PAL**

EDITOR  
**SHUCHITA CHATURVEDI**

#### OUR REPRESENTATIVES

Ahmedabad: Sumanben A Machhar, Bengaluru: Yashwant Shehna, Bhubaneswar: Itishree Singh Rathaur, Chennai: Sanjay Ghosh, Guwahati: Maruf Alam, Hyderabad: Krishna Vandana P, Jalandhar: Gagandeep Kaur Devgan, Kolkata: Sumita Chakraborty, Mumbai: Sangeeta Godbole, Thiruvananthapuram: Sudha S Namboothiry.

JOINT DIRECTOR, PRODUCTION  
**D K C HRUDHAINATH**

COVER DESIGN  
**BINDU VERMA**

**Yojana (English):** Room No. 647, Soochna Bhawan, CGO Complex, Lodhi Road, New Delhi-110 003.  
**E-mail (Editorial):** sec-yojanaeng-moib@gov.in

**YOJANA**, a development monthly published since 1957, is a theme-based journal providing in-depth analyses and views on socio-economic issues in the broader framework of government policies. Although published by the Ministry of Information and Broadcasting, **YOJANA** is not restricted to expressing the official point of view.

#### DISCLAIMER

- The views expressed in various articles are those of the authors and they do not necessarily reflect the views of the Government or the organisation/s they work for.
- Maps/flags used in the articles are only indicative and they do not reflect the political map or legal representation of the flag of India/any other country.
- The infographics/figures are provided by the authors through their reliable sources and **YOJANA** claims no responsibility for the same.
- Images, graphics and illustrations, wherever used, are mostly sourced from government channels and are indicative in nature.
- **YOJANA** does not own responsibility regarding the contents of the advertisements. The readers are requested to verify the claims made in the advertisements regarding courses, career-guidance books or institutions.
- **YOJANA** doesn't endorse or promote any brands or private entities presented as case studies in any of the articles.

#### SUBSCRIPTION/GRIEVANCES

Email: [pdjucir@gmail.com](mailto:pdjucir@gmail.com)  
Phone: 011-24367453

(Monday-Friday, 9:30 am- 6:00 pm)

**Postal Address:** Abhishek Chaturvedi, Editor, Journals Unit, Publications Division, Room No. 779, Soochna Bhawan, CGO Complex, Lodhi Road, New Delhi-110 003.

Please note that it will take at least eight weeks to start your subscription. Kindly raise your queries/grievances about non receipt of the journals only after this period.

**SUBSCRIPTION-RELATED DETAILS : Page 6**

## IN THIS ISSUE

### LEAD ARTICLE

## 9 G20 : FOR THE PLANET, PEOPLE, PEACE AND PROSPERITY

Amitabh Kant



### SPECIAL ARTICLE

## 16 INDIA'S RISING INFLUENCE G20 SUMMIT PUTS INDIA ON THE WORLD STAGE

Harsh Vardhan Shringla

## 41 BUILDING SAFETY, SECURITY, RESILIENCE, AND TRUST IN THE DIGITAL ECONOMY

Abhishek Singh

## 47 RESPONSIBLE USE OF AI BRIDGING INNOVATION AND ETHICS

Dr Sameer Patil, Shimona Mohan

## 53 ENERGY TRANSITION IN INDIA

Bhupinder Singh Bhalla

## 59 REMEMBERING PROF MS SWAMINATHAN

## 23 GREEN DEVELOPMENT PACT ROADMAP TO A SUSTAINABLE FUTURE

Leena Nandan

## 27 DESIGNING A CIRCULAR ECONOMY WORLD

Atul Bagai

## 35 DIGITAL PUBLIC INFRASTRUCTURE & PUBLIC PARTICIPATION

Akash Tripathi



## UPCOMING ISSUE YOJANA YEARENDER SPECIAL

Number of pages: 64

Details of the Sales Outlets of the Publications Division on Page 51

**YOJANA** is published in Assamese, Bengali, English, Gujarati, Hindi, Kannada, Malayalam, Marathi, Odia, Punjabi, Tamil, Telugu, and Urdu.



## Knowledge enrichment source

I have been a regular reader of Yojana for the past 3 years, and I am delighted to share that I have gained so much knowledge from Yojana. Every month, it provides the latest and most important content to the readers, and it becomes more helpful for the students who are preparing for competitive exams. The government schemes, data, and various topics in different fields make it more interesting to read. The clear and lucrative photos in the book make it more attractive to read. Yojana covered every aspect of issues with immense detail this October; be it all parts of infrastructure, whether it is rail, road, agriculture, etc. Thank you, Team Yojana, for bringing important topics to the attention of readers.

– **Richa Rai**  
Lucknow, UP

## Connectivity drives development

The October issue of 'Yojana' with articles 'PM Vishwakarma' and 'PM Gatishakti National Master Plan' were well-written and easy to understand. The Editorial 'Time-Speed-Scale' presents a bird's-eye view of what's in store in the pages of the magazine. PM Gatishakti holds the promise of driving India into a new era of growth and connectivity is absolutely correct. Infrastructure is not just a mode of transportation but a pathway to achieving growth and prosperity. Article 'Road infrastructure getting smarter' with sub-heads 'Creation of NHAI, phenomenal growth of NHs, faster development of Expressways, Fastag, and PPP mode' gave the reader an insightful reading. Write up 'Rail Infrastructure' with rail tourism and Vande Bharat Express trains covered, in detail, the Indian Railways. Establishing 'Unity Malls' in each state to promote ODOP and earmarking Rs 5000

crore to construct the malls is unique in itself and will no doubt foster economic development. All three articles relating to space were fascinating. To sum up, infrastructure enables trade and powers businesses.

– **Pratap Nayak**  
Bhubaneswar, Odisha

## India's infrastructure progress

The October issue of 'Yojana' on infrastructure was highly insightful. This issue shows how India is achieving its development path. The articles on 'Unity Mall' by Dr Sajjan Singh Yadav were interesting. Also, articles on space, road, rail, port, and agri-infrastructure were insightful and knowledgeable. As a regular reader of Yojana, I request that you bring up a separate issue on 'Telecom infrastructure'. Thanks, Team Yojana for bringing such a great issue back to back.

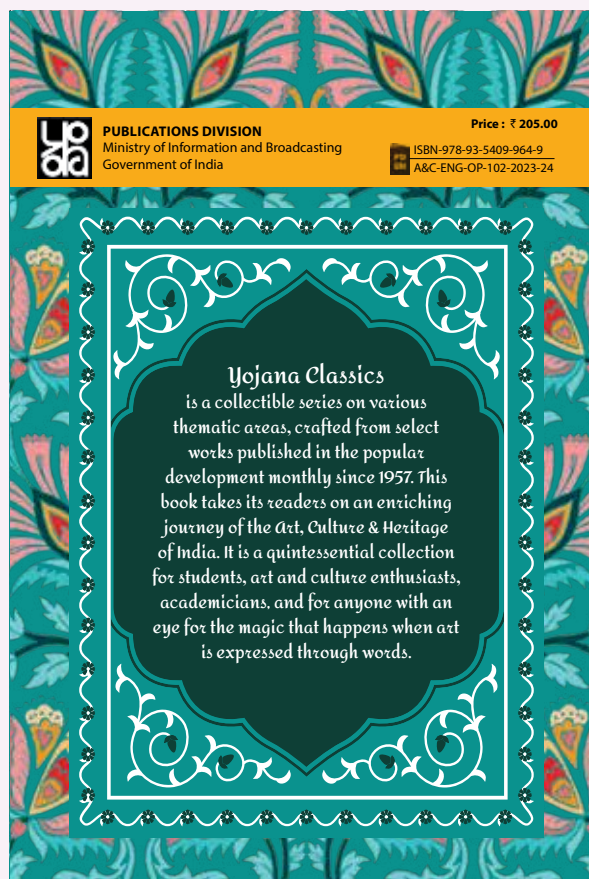
– **Md Wahid Sarwar**  
Jharkhand

## Infrastructure insights

The October 2023 issue of the Yojana provided us with comprehensive knowledge of the infrastructure of India. It gave a complete insight into India's infrastructure development. The articles on 'Voyage to study the Earth's Sun', 'Space infrastructure', 'Road infrastructure getting smarter', and especially the articles on 'G20 global startup ecosystem' were very insightful and interesting. This issue was very useful for civil service aspirants. I request that you please bring up a separate issue on 'women empowerment'. Thank you, Team Yojana, for this issue on infrastructure.

– **Saniya Sarwar**  
Jharkhand

# Yojana Classics



**Atul Kumar**

@ATULKUM49416869

Replying to @YojanaJournal

Always a Yojana Fan.

Loved the collection of articles in the book. Helpful for aspirants. Thanks to DPD for early bird discount.



**ક્રુષ્ના** @krushna1111110 · 19 Aug

Replying to @YojanaJournal

Got the book delivered today and it's amazing. Hope it gives an brief insight into the country's culture and heritage. Colourful and a quality one.



**Mayankraj Gupta** @MayankrajG · 17 Aug

Thank you @YojanaJournal

Hope there will be more books in the future covering different areas and fields.

Visit : [www.publicationsdivision.nic.in](http://www.publicationsdivision.nic.in)

## Pro-People, Pro-Planet

The world, as we see it today, is marred with conflicts, displacements, climate change, natural disasters, calamities, diseases, financial uncertainty, and inequality. Global challenges like these, affect the vulnerable, including children and women the most. In this defining phase, the world needs concrete action and sustained cooperation to minimise human suffering and establish an order towards the well-being and prosperity of all. Various stakeholders, including decision-makers, global communities, international organisations, governments, and civil societies, are expected to collaborate to build a better future for the people and the planet.

Against this backdrop, India assumed the G20 Presidency, which was considered to be a transformative moment with the potential to hold answers and provide direction to several pressing international problems. True to the spirit of 'One Earth, One Family, One Future', the New Delhi Leader's Declaration that came out of the G20 Summit clearly stated action points and directives towards an affirmative resolve.

In the last eight decades post the World War, global order has seen dramatic changes due to economic growth, decolonisation, technological progress, better health and infrastructure, reforms in various sectors, and deeper international cooperation. The need for multilateralism to adequately address contemporary and inter-connected global challenges of the 21<sup>st</sup> century is being felt more than ever today. The international development finance system needs to be further strengthened for more inclusive and equitable growth, with a continued focus on maximising development impact for vulnerable sections and low- and middle-income countries.

Making the world more inclusive with the equal participation of all stakeholders including the Global South was a major thrust area of the presidency. The inclusion of the African Union as a permanent member of G20 is expected to address its concerns, aspirations, and participation in international partnerships. The vision to create the India-Middle East-Europe Economic Corridor (IMEC) as a network of highways, railroads, and waterways for transportation aims to foster integration between Asia, the Arabian Gulf, and Europe, and advance economic development. With India's commitment to sustainable development, the G20 leaders adopted the Green Development Pact which demonstrated their collective commitment to addressing crucial matters related to climate change. Along with this, the Global Biofuel Alliance was formed in the spirit of constructive collaboration that characterised India's presidency.

With the G20 presidency handed over to Brazil, the world looks forward to building on the foundation laid during the Indian presidency. Under India's leadership, inclusive development, digital infrastructure, and sustainability were addressed, emphasising a human-centric approach. The New Delhi Leaders' Declaration covers many different facets of human-centered development and leaves no one behind. It stressed gender equality and women-led development through gender-inclusive economic and social empowerment. The G20's dedication to women's emancipation is further demonstrated by the creation of the new Women's Working Group.

As this historic G20 presidency concludes, it is essential to reflect on the multifaceted impact it had on the nation. This issue of Yojana aims to provide a comprehensive view from the subject experts of the influence that India's G20 presidency has had across various sectors, from economic and environmental to diplomatic, technological, and social. The legacy of this presidency must continue to shape the world's policies, partnerships, and action with a pro-people and pro-planet approach, keeping in mind a defining statement from the New Delhi Leaders' Declaration that was, 'Today's era must not be of war'. □





# G20 FOR THE PLANET, PEOPLE, PEACE AND PROSPERITY

**India's G20 Presidency is a landmark, successfully championing both the climate and development agendas, and recognising that countries should not have to choose between poverty alleviation and environmental protection. Drawing from our own experiences in spearheading socio-economic transformations, India's developmental model has garnered global recognition.**

**AMITABH KANT**

The author is India's G20 Sherpa and former CEO, NITI Aayog. Email: [g20sherpaoffice@mea.gov.in](mailto:g20sherpaoffice@mea.gov.in)

**A**t the outset of our G20 Presidency, we were bestowed with a clear mandate by Prime Minister Narendra Modi: this had to be an ambitious and inclusive presidency, one that placed the interests of the Global South at its very core. We embraced this directive wholeheartedly, turning every obstacle into an opportunity, and in the process, we achieved

an extraordinary feat—a New Delhi Leaders' Declaration (NDLD) comprising 83 paragraphs, with no voice of dissent. This remarkable document signifies a momentous global consensus, underscoring the power of unity in addressing common challenges.

The New Delhi Leaders' Declaration represents a fundamental shift in focus, from conflict and



In the fight against corruption, the Declaration reiterates a steadfast commitment to fostering transparency, accountability, and integrity in both public and private sectors, emphasising the need for collaborative efforts to curb this global challenge.

### Accelerating Progress on the SDGs

The world faces a critical juncture, with existential challenges demanding immediate attention. The latest UN SDG Report reveals that only 12% of SDG targets are on track, while 30% have stagnated or regressed since 2015. The looming 1.5°C temperature increase, driven by alarming trends like the loss of 50 million hectares of forests from 2015 to 2020 and rising weather-related disasters, disproportionately impacts the developing world.

Post-Covid recovery poses additional challenges, with global economic conditions marked by high

inflation, tight monetary policies, restrictive credit, and mounting debt distress in many developing nations. At the midpoint of the Agenda 2030, countries grapple with the need to invest in both development and climate change mitigation and adaptation simultaneously.

India's G20 presidency is a landmark, successfully championing both the climate and development agendas, and recognising that countries should not have to choose between poverty alleviation and environmental protection. Under its leadership, an action plan for accelerating SDG progress has been delivered, taking a cross-cutting approach and emphasising the critical role of data in driving development. The endorsement of G20 Principles on harnessing Data for Development (D4D) reinforces this commitment. Additionally, the G20 Deccan High-Level Principles (HLPs) on Food Security and Nutrition 2023, along with the promotion of ancient grains like millets, hold the promise of ensuring global food and nutritional security—an essential aspect of sustainable development.

India's G20 presidency recognised the profound impact of climate change on health and established a Global Initiative on Digital Health to address evolving health challenges.

division to development and cooperation. It showcases India as a global leader dedicated to enhancing policy and regulatory coherence among G20 countries, fostering more predictable and reliable trade, investment, and supply chains, while pushing the ambitions of climate action and inclusive development.

### Strong, Sustainable, Balanced, and Inclusive Growth

Recognising that economic growth underpins a country's prosperity and developmental potential, the Declaration foregrounds the need for strong, sustainable, balanced, and inclusive growth, with a clear recognition of the pivotal role of private enterprises, notably Micro, Small, and Medium Enterprises (MSMEs) and startups, in fostering innovation and employment opportunities. Additionally, it advocates for the promotion of trade and investment policies, along with the reform of the World Trade Organization (WTO), demonstrating leaders' tangible commitments.

Furthermore, the Declaration commits to addressing skill gaps, promoting decent work, and accessing to opportunities and resources to achieve sustainable development.

In this era of unprecedented global challenges, India's approach resonated with philosophies emphasising harmony with the Earth, sustainable growth, and inclusivity. These philosophies, rooted in India's cultural heritage, guided our journey towards a more equitable and sustainable world. Inspired by thinkers like Pandit Deen Dayal Upadhyay and Mahatma Gandhi, our philosophy aligned with the essence of the 2030 Agenda—leaving no one behind and balancing economic prosperity with living in harmony with the Earth. This holistic approach has shaped India's sustainable growth trajectory.

Yet, the immense annual SDG financing gap, ranging from billions to trillions of pounds, underscores the vital role of economic growth in sustainable development and the transition to clean energy. The 'G20 2023 Action Plan to Accelerate Progress on the SDGs' is a milestone achievement, promoting equitable, strong, sustainable, and inclusive economic growth while addressing challenges like access to finance and technology.

### Green Development Pact, Climate Finance, and Mission LiFE

India's New Delhi Leaders' Declaration (NDLD) includes the 'Green Development Pact'—a comprehensive roadmap for the next decade to

address the environmental crisis through global cooperation.

By committing to this pact, the G20 leaders pledge to pursue environmentally sustainable and inclusive economic growth and development in an integrated and balanced manner, benefiting the Global South. They call upon all countries to align their Nationally Determined Contributions (NDCs) with the Paris Agreement's temperature goals and encourage economy-wide greenhouse gas (GHG) reduction targets in future NDC cycles. The G20 countries also commit to enhancing climate action across mitigation, adaptation, and means of implementation and support, including a successful conclusion to the global stocktake at COP28.

In the energy transition, the G20 has agreed to High-Level Principles (HLPs) on hydrogen, critical mineral collaboration, a global biofuels alliance, and efforts to triple renewable energy capacity, among other initiatives. The NDLD emphasises the role of healthy ecosystems in addressing climate change, biodiversity loss, and pollution, with a strong message on ending plastic pollution and promoting the circular economy. The pact also includes HLPs on Lifestyles for Sustainable Development contributing to significant emission reductions by 2030.



LiFE (Lifestyle for Environment) is India's unique offering to the world, born from Prime Minister Narendra Modi's vision to transform India's traditional, sustainable practices, and philosophical ethos into a scalable, global movement that changes the way societies consume and produce.

India's commitment to climate justice and equity is evident in the NDLD, where they call for substantial financial and technological support from the Global North to combat climate change and support sustainable development. The declaration urges nations to set an ambitious, transparent, and trackable New Collective Quantified Goal (NCQG) of climate finance by 2024, starting at £100 billion, and advocates for doubling collective adaptation finance compared to 2019 levels by 2025.



recognition. The profound influence of digital public infrastructure (DPI) in India is unmistakable. Whether it's digital payments, Co-Win, DigiLocker, or Direct Benefit Transfers (DBT), technology has been instrumental in reaching the farthest corners, profoundly changing lives.

Highlighting this impactful journey has played a pivotal role in establishing a consensus on the G20 Framework for Digital Public Infrastructure, enabling nations worldwide to embrace, develop, and scale similar DPI systems. Through the collaborative efforts of the One Future Alliance, we are extending support to Low and Middle-Income Countries (LMICs), providing both capacity-building and financial assistance to foster the growth of their DPI systems. This collective endeavour aims to empower nations to harness the potential of digital infrastructure for the betterment of their societies.

### **Gender Equality and Empowering All Women and Girls**

This declaration is multifaceted, encompassing various aspects of human-centric development and leaving no one behind. It champions women-led development, economic and social empowerment, gender-inclusive climate action, and women's food security, marking it as the most ambitious communique for gender equality and women-led development. Further, the G20's commitment to women empowerment is exemplified by the establishment of the Women's Working Group, the first meeting of which is set to take place during the Brazilian Presidency.

### **The Voice of the Global South**

At the heart of India's advocacy was a visionary proposal—the inclusion of the African Union (AU) as a permanent member of the G20. This proposal was grounded in a stark reality: the Global South, and notably Africa, is poised to drive a staggering 80% of global economic growth, as per the International Monetary Fund (IMF). Acknowledging the seismic shifts in global economic dynamics, India advocated for the AU's permanent seat at the G20 table. This proposition encapsulated a genuine belief in the need for Africa's representation and contribution in

Notably, major developed economies have finally recognised the monumental resources required—£5.9 trillion by 2030—for developing countries to meet their NDCs, and an additional annual £4 trillion for clean energy technologies, spotlighting the immense needs of the Global South.

Recognising this need for substantial financing, the G20 emphasises the importance of better, larger, and more effective Multilateral Development Banks (MDBs) and explores measures such as currency exchange guarantees and disaster clauses in debt repayment agreements to create a more responsive international development finance system. India has also been at the forefront of driving reforms within the United Nations, particularly in restructuring principal organs like the UN Security Council, aiming for a structure that better serves Global South countries' interests.

### **Technological Transformation and Digital Public Infrastructure**

Drawing from our own experiences spearheading socio-economic transformations, India's developmental model has garnered global

shaping global policies.

Moreover, India's G20 presidency went beyond rhetoric by taking proactive steps to elevate the voices of African nations within the forum. Invitations were extended to a spectrum of African countries, including Egypt and Nigeria, to partake in G20 discussions. Not stopping there, the African Union Chair from Comoros and AUDA-NEPAD were also welcomed to enrich the dialogue. This concerted effort bore fruit, resulting in the highest-ever participation of African nations in G20 meetings. This inclusivity reflected India's commitment to ensuring that African perspectives were not only heard but prominently featured in G20 deliberations.

A pivotal moment in India's G20 presidency was the 'Voice of the Global South Summit.' This landmark event, held earlier in the year, witnessed the gathering of 125 countries and the participation of 18 Heads of State from the Global South. The summit served as an invaluable platform for nations to articulate their concerns, aspirations, and priorities on the global stage. These gatherings marked the initial steps towards reshaping international discussions to better mirror contemporary realities and acknowledge the influential role of the Global South in shaping the world's future.

In fact, India's entire G20 Presidency placed a strong emphasis on issues such as Multilateral Development Banks (MDB) reform, digital public infrastructure (DPI), and climate action, recognising that these are pivotal concerns for the developing world. The entire agenda was meticulously crafted to foreground the needs and interests of the Global South, which have often been underrepresented in international forums. By championing these causes, India aimed to rectify historical imbalances and ensure that the voices of developing nations were heard and addressed on the global stage, fostering a more equitable and inclusive approach to global governance.

**The 'G20 2023 Action Plan to Accelerate Progress on the SDGs' is a milestone achievement, promoting equitable, strong, sustainable, and inclusive economic growth while addressing challenges like access to finance and technology.**

## A People's G20

It's not just at the international level that India has championed inclusivity. Through *Jan Bhagidari* events, citizens from across the nation actively engaged in G20-related events and activities. With over 220 meetings spanning 60 cities and more than 25,000 delegates participating, the G20 became accessible to people from various backgrounds. The Ministry of Education's efforts in organising events at different levels drew over 233 million participants, fostering awareness about G20 priorities.

*Jan Bhagidari* went beyond participation numbers, encompassing a range of engaging activities, from university lectures to interactive Model G20 meetings, pavilions at festivals, quiz contests, food festivals, and more. Working Groups introduced innovative methods like cyclothons and rallies to enhance public involvement.

India's cooperative federalism model, fostering collaboration between state and central authorities, led to transformative urban development initiatives and showcased indigenous cultural heritage, which in turn promoted tourism and generated employment opportunities. Further, the Engagement Groups played a vital role in involving citizens in the G20 narrative and contributing expertise and perspective from civil society towards the final formulation of the NDLD. Groups like Labor20, Science20, and Youth20 also saw substantial citizen participation, with innovative activities spanning diverse regions, including Northeastern states and Jammu & Kashmir, and social media further amplified this reach, resulting in over 14 trillion impressions.

In an increasingly divided world, India's people-driven and human-centric G20 Presidency demonstrated the power of collective action. The Prime Minister referred to it as a 'people's presidency,' embodying the spirit of the world's largest democracy in shaping a more equitable global future.

*Views expressed are personal. □*

## Bhashini App: Bridging the Digital Divide with Language Diversity

A Russian delegate at the G20 Summit was pleasantly surprised when the 'Bhashini' responded to his query in his mother tongue, something unimaginable just a few years ago.

But this is just a peep into the future. Some of the possibilities that technology could bring into our lives were brought to life at the Digital India Experience Zone in Hall 4 of the International Media Centre. The delegate felt at home conversing with the machine and was able to get all the required information on the G20 finance track in Russian.

The Bhashini and its Bot Jugalbandi were borne out of the Ministry of Electronics and Information Technology's initiative to showcase some of the cutting-edge technologies to the delegates of the G20 during the Summit.

They had an immersive experience of India's prowess in digital infrastructure in accordance with the theme of India's G20 presidency, 'One Earth, One Family, One Future', which focuses on inclusivity. Bhashini promotes this by breaking the language barriers. It brings people together not just in India, as envisioned in the mission of *Ek Bharat Shreshtha Bharat*, but across the globe by linking people across different languages, truly reflecting the age-old Indian ethos of *Vasudhaiva Kutumbakam*.

At its core, Bhashini is a digital symphony, harmonising with Indian languages. It provides a welcoming embrace of familiarity, offering voice-based access to the digital universe. Its mission is to empower every Indian with the ability to navigate the internet and access digital services in their native language. This will enable

them to be better informed citizens and be an integral contributor to *Viksit Bharat* in Amrit Kaal through *Jan bhagidari*.

But Bhashini is more than just a gateway; it's a hub of collaboration and community. Nestled within its digital halls is the *Bhasha Daan* section, where individuals from diverse walks of life converge to contribute to a plethora of crowd sourcing initiatives. This spirit of collective effort resonates deeply with the ethos of India – Unity in Diversity.

### Bhashini: Widening the Horizons

The platform provides a plethora of opportunities to not just the domestic but also international communities and Jugalbandi Bot is

one of the applications of this technology. One can make use of this technology to ensure the last-mile delivery of services using the platform in the language and dialect the people speak. It can also be utilised to help fill out the forms in their own dialect through the feature phone (IVR). At the heart of a vibrant democracy lies the *Jan bhagidari*. This platform provides an opportunity to further deepen democracy at

the grassroots level in India.

To witness the magic of Bhashini, one needs only to visit its virtual abode: <https://www.bhashini.gov.in/en/>. Here, a vibrant ecosystem thrives where institutions, industry players, research groups, academia, and individuals unite. Together, they craft an ever-evolving repository of data, training datasets, benchmark datasets, open models, tools, and technologies. □

Source: PIB/ Dr Pavankumar R Khedkar



## G20's Hidden Gem: The Artistry and Optimism of a Madhubani maestro

Amidst the bustling corridors of the G20 Summit venue in New Delhi, we discovered an unsung hero of art and culture, Shanti Devi, a nearly 60-year-old lady hailing from the heartland of Bihar, Mithila. Her name may not be familiar to many, but her exquisite Madhubani paintings have brought her not just acclaim but also the coveted National Award for her extraordinary craftsmanship.

With a warm smile and an air of simplicity that instantly captivates, this unassuming artisan stands as a testament to the power of art to transcend boundaries. Her eyes sparkle with a quiet wisdom that comes from years of devotion to her craft.

Madhubani painting is a Geographical Indication (GI)-tagged art form that originated in the Mithila region of Bihar. It is one of the oldest and most vibrant art forms in India, with a history that can be traced back over 2,500 years. It is renowned worldwide for its intricate detailing and vibrant colors. Artists use only natural pigments and brushes made from twigs to create these visually captivating and culturally significant artworks. It takes an incredible amount of patience and dedication to create a single piece of medium-sized artwork, and this talented artist dedicates 7-10 days to each masterpiece.

Before the pandemic struck, Shanti Devi would sell her creations for a decent sum of Rs 5,000 each, providing a sustainable livelihood for her family. However, the Covid-19 pandemic brought a downturn in her sales, pushing her into financial uncertainty. Yet, as we spoke to her, her optimism and enthusiasm were infectious.

With eyes brimming with pride, she shared her latest creation, a magnificent Madhubani



artwork depicting the success of Chandrayaan-3, India's lunar exploration mission. "This is now my most-prized possession. I will not sell it, but keep it in my home until I get an opportunity to present it to Modiji", she says. In

her art, she not only preserves her cultural heritage but also celebrates India's achievements on the global stage.

Cultivating her craft with unwavering dedication, this humble artisan carried a profound sense of purpose. Through her paintings, she has become an ambassador for her village, her state, and her country. "I will do my part as much as I can to preserve this artform, and I hope that my children and grandchildren

will carry on this tradition", she said.

As we watched her carefully craft each stroke of her brush, it became evident that her work is more than just a means of livelihood. It's a labour of love, a dedication to

preserving the rich heritage of Madhubani art, and a symbol of resilience in the face of adversity.

Her presence at an event as significant as the G20 summit is a testament to the enduring power of art to connect people and cultures. In her simplicity, she reminded us that even in the grandeur of international politics and diplomacy, the heart and soul of a nation can be found in the hands of its artists.

As world leaders gathered in New Delhi to discuss critical global issues, this Madhubani maestro quietly but profoundly contributed to the cultural tapestry that makes India so unique. Her story is not just about art but about the indomitable spirit of those who continue to paint their dreams against all odds. □

Source: PIB/Lekshmi Priya SS



# INDIA'S RISING INFLUENCE G20 SUMMIT PUTS INDIA ON THE WORLD STAGE

**India's G20 Presidency has indeed marked a diplomatic turning point and a monumental success that reverberates across the world stage. As one of the world's fastest-growing economies, India has risen as a potent force, and its unwavering commitment to advocating for the concerns of the Global South has earned it the title of a Vishwamitra, a universal friend and mediator.**

**HARSH VARDHAN SHRINGLA**

The author is the G20 Chief Coordinator, Ministry of External Affairs, GoI. Email: [chiefg20coord@mea.gov.in](mailto:chiefg20coord@mea.gov.in)

**I**ndia's G20 Presidency stands as a monumental achievement in the annals of global diplomacy. At its core, this success is attributed to the transformative vision of the Prime Minister of India to decentralise and democratise the G20 process. This approach not only left an indelible mark but will also become the enduring legacy of India's G20. Moreover, the adoption of the catalytic and

comprehensive New Delhi Leaders' Declaration further underscores India's diplomatic prowess. India's G20 Presidency has thus cemented its place at the international high table and raised its stature as a global champion of peace.

The G20 is among the most influential groupings in today's world order, as it represents around 85% of the global GDP, over 75% of global trade, and about two-thirds of the world population.



approach, each state had the opportunity to leave an indelible cultural imprint on the minds of visiting delegates, who would return to their home nations as cultural ambassadors for India's rich and unique cultural heritage. It was a profound exchange that transcended diplomatic formalities and fostered genuine connections among nations.

This transformative approach not only welcomed the world to India but also allowed India to project its best practices on the global stage. The smooth symphony of cooperative federalism required to host over 200 international meetings in 60 cities showcased India's organisational prowess and collaborative spirit to the world. This gathering of nations transcended the ordinary, evolving into an unforgettable presidency that left an indelible mark on both India and the world.

It was the Prime Minister's faith in India's potential that fuelled this monumental exercise. By harnessing whole-of-government and whole-of-society approaches, an India previously unseen was unveiled. He intentionally called to organise the G20 meetings in cities that had not previously garnered global attention, including those in the North-East region. This visionary move resulted in a transformative effect on these States and Union Territories, elevating them to the status of proficient hosts for world-class conferences, equipped with the necessary physical infrastructure. This urban metamorphosis, with enhancements, additions, and aesthetic improvements in host cities,

India inherited this prestigious presidency at a particularly challenging moment in world history. The international order was beset with a unique set of crises; the impact of the Covid pandemic, exacerbated by the Ukraine conflict, brought about the threat of global recession, high inflation, and energy, food, and debt crises.

Amidst this canvas of uncertainties, bold leadership was critical. India needed to rise to the occasion, and it did so extraordinarily. The Prime Minister had pledged in Bali last year that ours would be an 'inclusive, ambitious, decisive, and action-oriented' presidency, and as we entered the final month of our presidency, India's G20 has more than lived up to that pledge. India has set a precedent for a more inclusive and interconnected world order.

India prioritised a human-centric and democratic approach during its presidency, a critical decision in the face of strong geopolitical and ideological divisions that cut across the G20. The Prime Minister thus embarked on India's G20 journey with a mission to showcase our nation's celebration of diversity and demonstrate how this diversity can serve as a unifying force on the global stage.

To effectively achieve this, over 200 G20 meetings were held across the length and breadth of India, in every single state and union territory. This way, G20 delegates could get a first-hand experience of what each diverse part of India has to offer. Through this expansive pan-India





citizen became a stakeholder in India's G20 Presidency.

Spanning 37 different areas of human endeavour, including education, agriculture, trade, culture, and women's development, the Jan Bhagidari initiative brought global ideals to everyday lives. To further expand the accessibility and reach of India's G20 efforts, comprehensive G20 information was made available through the dedicated G20 website and mobile application, monthly newsletters, and social media. The result of this nationwide participation was the unprecedented popularity and celebration of India's G20. India's G20 logo thus became a ubiquitous symbol of national pride.

This unique approach to the G20 continued to shine at the

bestowed many states with newfound confidence and global visibility.

Moreover, this spotlight also placed often underestimated tourism prospects on an international platform while simultaneously reinvigorating traditional handicrafts that languished during the Covid-induced hiatus.

The Prime Minister has often said that the new world order must focus on human-centric globalisation. India's transformation of the G20 into a 'People's G20' exemplified this philosophy in action. Over 1.5 crore citizens participated in the G20 process through *Jan Bhagidari* or Citizens Engagement events. The G20 University Connect Programme directly involved 101 universities and lakhs of students across the country, and even India's G20 logo itself was crafted from the collective ingenuity of thousands of Indians. Thus, every single

historic New Delhi Leaders' Summit. The adoption of the G20 New Delhi Leaders' Declaration was an extraordinary achievement, especially considering the geopolitical divisions within the grouping. Even under normal circumstances, complex multilateral processes like G20 negotiations often go down to the wire. However, despite ideological differences and complex geopolitics, the Prime Minister announced a consensus among member nations during the first half of the first session of the Leaders'

Summit. A crucial element for the successful and unanimous Leaders' Declaration was his steadfast commitment over the last decade towards cementing India's identity as a reliable partner on the global stage. His decade-long, unwavering dedication to reminding the international community of our shared humanity also seamlessly translated into the theme India selected for its tenure as the chair of the G20: '**Vasudhaiva Kutumbakam.**'

**India prioritised a human-centric and democratic approach during its presidency, a critical decision in the face of strong geopolitical and ideological divisions that cut across the G20.**

Rooted in our cultural ethos, this transformative philosophy of 'One Earth One Family One Future' united the G20. As the 'Mother of Democracy', India successfully exemplified how collaborative action catalyses global change while also fostering 'healing, harmony, and hope for all'.

An impressive 112 outcomes and presidency documents were produced under India's leadership, more than doubling the substantive work of previous presidencies.

The 83-paragraph declaration symbolises a concerted effort to address global challenges while embodying a spirit of collaboration, cooperation, and shared responsibility. It is a historic and path-breaking declaration that has heralded a golden age of human-centric globalisation.

It was India's mission to share its best practices with the world, and this has been achieved successfully in the adopted declaration. The New Delhi Leader's Declaration has a significant India footprint with the adoption of 'The Deccan High-Level Principles on Food Security and Nutrition', 'The Chennai High-Level Principles for Blue/Ocean Economy', 'The Goa Roadmap for Tourism', 'The Gandhinagar Implementation Roadmap for Land Restoration', and 'The Jaipur Call for Action to Enhance MSMEs Access to Information'.

As the chair of the G20, India spearheaded efforts to secure consensus among member nations on ambitious and practical solutions, aligning with its domestic priorities, including climate action, digital public infrastructure, sustainable development, and inclusive governance.

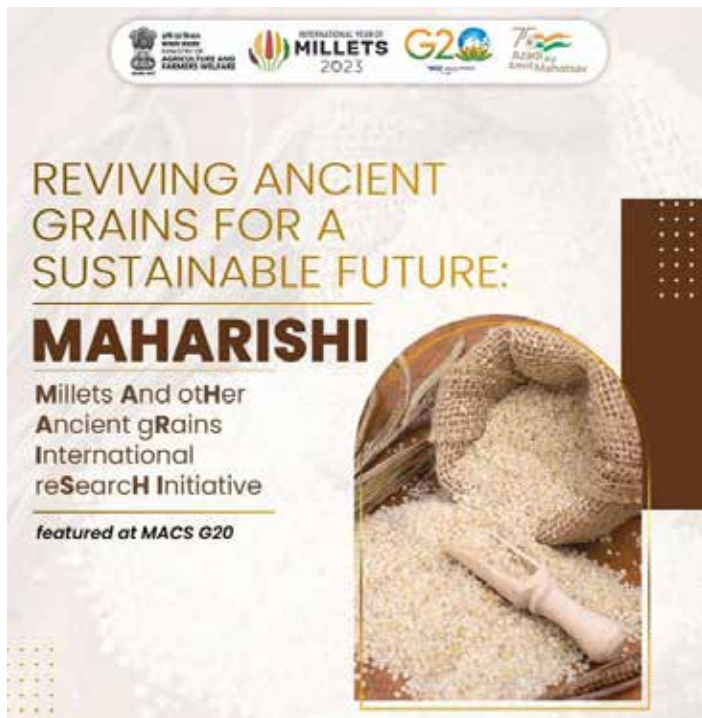
**India has not merely navigated but steered the changing tides of the global order as the leader of the G20. It has demonstrated its mettle in dealing with complex international issues while leading the way in shaping the future.**

A key priority of India's G20 Presidency was to create a more inclusive world where the voice of the Global South could no longer be overlooked. The greatest achievement in this regard was the acceptance of India's proposal to welcome the African Union as a permanent member of the G20. With the African Union now a permanent member of the G20, a promise Prime Minister had made to Senegal President and former AU President Macky Sall last year, India has succeeded in

making the G20 among the most representative international groupings that exists today, one that truly reflects the realities of the 21<sup>st</sup> century.

India led the creation of a Global Digital Public Infrastructure Repository, a 'virtual stack' where non-G20 and G20 countries alike can voluntarily share their open-source mechanisms to drive a mutually beneficial ecosystem. Its proposal to





2020 to 2025, starting in 2023.

Among India's priorities was also to reform multilateral institutions, and an incredible achievement in this regard was the G20 committing to reform Multilateral Development Banks and address global debt issues.

New initiatives, such as Startup 20, Disaster Relief Reduction Group, and meetings on Cyber Security, also reflected India's proactive approach during its G20 Presidency.

India's G20 Presidency has indeed marked a diplomatic turning point and a monumental success that reverberates across the world stage. India, with its dynamic leadership under the Prime Minister, has showcased its remarkable ability to bridge global cleavages. As one of the world's fastest-growing economies, it has risen as a potent force, and its unwavering commitment to advocating for the concerns of the Global South has earned it the title of a *Vishwamitra*, a universal friend and mediator.

Through visionary leadership, inclusivity, and a resolute commitment to addressing global challenges, India has orchestrated a transformative era of cooperation and collaboration. It has not only been a torchbearer of its own interests but has astutely considered the collective good, recognising that the interconnectedness of nations requires shared responsibility. By prioritising the developmental agenda within the G20, India has paved a roadmap towards a more resilient and inclusive economic order, setting the stage for a prosperous and equitable future for all.

India has not merely navigated but steered the changing tides of the global order as the leader of the G20. It has demonstrated its mettle in dealing with complex international issues while leading the way in shaping the future. As India passes the torch, it leaves behind a formidable legacy of leadership that will continue to exert a profound influence on the G20 and the world, shaping a brighter and more harmonious path forward for generations to come. In this transformative journey, India's rise as a global leader is not just a matter of prestige but a testament to its unwavering commitment to forging a better world for all. □

create 'One Future Alliance' was also welcomed, which is a voluntary initiative aimed at building capacity and providing technical assistance and adequate funding support for implementing digital public infrastructure in low and middle-income countries.

Sustainable and inclusive growth was prioritised in the declaration with the G20 committing to strengthen global value chains, aid developing countries, and encourage sustainable investment, alongside addressing skill gaps and promoting decent work. They recognised the lagging progress on Sustainable Development Goals (SDGs), and adopted an action plan to expedite the 2030 Agenda, including the High-Level Principles on Lifestyles for Sustainable Development, which is based on the Government's 'Mission LiFE'.

Furthermore, the G20 committed to enhancing global food security and nutrition by welcoming India's proposal for the G20 Millets and other Ancient Grains International Research Initiative (MAHARISHI), which focuses on climate-resilient grains. Furthermore, India's strong leadership in climate action secured a resolute commitment from developed countries within the G20, assuring that they will uphold their promise to provide \$100 billion annually from



# GREEN DEVELOPMENT PACT

## ROADMAP TO A SUSTAINABLE FUTURE

**The Green Development Pact for a Sustainable Future has successfully concretised actions that address the social, economic, and environmental aspects of sustainable development. It comprises all the issues that are crucial for the world. India has successfully led the formulation of a strategy that mainstreams the concerns of the Global South.**

---

**LEENA NANDAN**

The author is the Secretary, Ministry of Environment, Forest and Climate Change, GoI. Email: secy-moef@nic.in.

---

**T**he basic principle of sustainable development is to strike a balance amongst the economic, environmental, and social dimensions of developmental pathways in such a manner that present and emergent needs are addressed while safeguarding the interests of future generations.

The various manifestations of climate change underscore the need for countries to revisit their policies and actions and ensure that sustainability is mainstreamed in every sector. India is leading

by example, with a development trajectory that takes into account both the economy and ecology. As India took up the G20 Presidency in December last year, climate and environmental sustainability were identified as core topics. The G20 also stressed the urgency of enhancing cross-sectoral adaptation and building resilience to safeguard livelihoods and protect developmental achievements, especially in developing nations.

The G20 countries collectively represent two-thirds of the world's population, contribute



to 85% of the global Gross Domestic Product (GDP), and account for 75% of international trade. Environment issues have, over time, become paramount global concerns, prompting nations to intensify their focus on green and resilient development. With this premise, the G20 leaders adopted the Green Development Pact through the New Delhi Leaders' Declaration, which demonstrated their collective commitment towards addressing crucial matters such as the protection and conservation of forests and ecosystems, agreement on global land restoration targets, and action against marine plastic litter, along with recognising the power of collaboration in environmental action. Partnerships are key to sustainable progress, and the Global Biofuel Alliance is a shining example of the spirit of constructive collaboration that characterised India's G20 Presidency.

The Prime Minister's articulation of Mission LiFE – Lifestyle for Environment, found huge resonance in all G20 countries. The need to promote mindful utilisation of resources instead of mindless consumption was well accepted, as is evident from the adoption of high-level principles for sustainable lifestyles. Embedding the core concepts of sustainability

into individual choices and behaviours and also institutionalising them in the value chain was a concept that was universally acknowledged and unanimously accepted.

In order to decouple growth from environmental degradation and enhance sustainable consumption and production, including primary resource consumption, the G20 focused on the critical role played by the circular economy, extended producer responsibility, and resource efficiency in achieving sustainable development. To 'walk the talk', the Indian Presidency launched the Resource Efficiency and Circular Economy Industry Coalition (RECEIC), and this initiative was also acknowledged by the G20 leaders. The most significant benefit of a circular economy is the reduction in waste generation. By reusing, refurbishing, and recycling products and materials, less waste ends up in landfills or incinerators, reducing the environmental impact of waste disposal. Circular economy practices focus on extending the life of products and materials, thus conserving natural resources such as minerals, metals, and fossil fuels. This reduces the need for resource extraction and helps mitigate the environmental damage associated with it. A circular economy can create jobs in various sectors, including repair, remanufacturing, recycling, and waste management, and thus stimulate economic growth.





The Green Development Pact has placed major emphasis on ecosystem restoration. The commitment to restoring by 2030 at least 30% of all degraded ecosystems and scaling up efforts to achieve land degradation neutrality speaks volumes about the seriousness with which the G20 accords to the challenge of environmental degradation. Commitment towards prevention and mitigation of forest fires and remediation of mining-degraded lands was a key element of the Declaration. All members supported the G20 ambition to reduce land degradation by 50% by 2040 on a voluntary basis and noted the Gandhinagar Implementation Roadmap and Gandhinagar Information Platform in this context. The other priority was the protection of ocean-based ecosystems and the recognition of the blue economy as a high-potential area. The G20 adopted the High-Level Principles for a Sustainable and Resilient Blue/Ocean-based Economy and expressed determination towards harnessing the potential of seas and oceans in a sustainable manner.

The Green Development Pact for a Sustainable Future has successfully concretised actions that address the social, economic, and environmental aspects of sustainable development. The Pact also accorded recognition to the latest science, as well as to the fact that technology development and transfer on voluntary and mutually agreed terms,

capacity building, and financing are imperative for long-term, meaningful impact.

The Pact delves deep into the elements of macroeconomic risks and climate finance with the launch of the G20 Report on Macroeconomic Risks Stemming from Climate Change and Transition Pathways. Finance for both achieving NDCs and implementing adaptation action is crucial, and G20 recognition in this regard is a significant achievement, along with acceptance of the role that blended finance, private finance, and risk-sharing facilities, including the enhanced role of MDBs, have to play in mobilising climate finance. Developed countries reaffirmed mobilising \$100 billion per year for developing countries, and the expectation that this will be met for the first time this year bodes well for the future. The multi-year G20 Technical Assistance Action Plan (TAAP) and the voluntary recommendations made to overcome data-related barriers to climate investments saw G20 endorsement, which is an equally important milestone.

Climate impacts hit hard at the grass-roots level, especially through extreme weather events. Communities living in villages and towns are most vulnerable to such climate risks. The Pact aims to streamline efforts to build resilience against disasters through the institutionalisation of the Disaster Risk Reduction (DRR) Working Group. The Pact also called for accelerating progress on early warning and early action through strengthening national and local capacities, innovative financing tools, private sector investment, and knowledge sharing. It was also recognised that resilient urban infrastructure is a key requirement for making cities of today future-ready and planning for this needs to be anchored in access to finance.

The Green Development Pact comprises all the issues that are crucial for the world. India has successfully led the formulation of a strategy that mainstreams the concerns of the Global South. The implementation of the Green Development Pact will further strengthen the G20 member states' efforts towards achieving SDG targets. By emphasising the need for all nations to build synergy in core areas, the G20 Leaders' Declaration under India's Presidency has offered a strong direction and nudge, and most importantly, a clear roadmap for a resilient future. □



# DESIGNING A CIRCULAR ECONOMY WORLD

**The High-Level Principles on Lifestyles for Sustainable Development, adopted by the G20 during India's Presidency, reflect the need for commitments to promote sustainable consumption and production. The time is now for collective actions to reduce the global material footprint while meeting basic needs for all. In doing so, it is imperative to create enabling conditions to spark the shift to circular and green economic growth, while catering to different developmental needs and national circumstances.**

---

**ATUL BAGAI**

The author is the Head of the United Nations Environment Programme Country Office, India. Email: [bagai@un.org](mailto:bagai@un.org).

---

**MANISHA CHOUDHARY**

The co-author is the Programme Officer, UNEP India. Email: [manisha.choudhary@un.org](mailto:manisha.choudhary@un.org).

---

**T**he world's population may be near 10 billion by 2050. This would mean greater demand for food, fashion, travel, housing, and other related products and services. To support population needs, the annual global extraction of materials has already grown from 22 billion tonnes (1970) to 70 billion tonnes (2010), and is expected to

roughly double by 2060. In less than eight months this year, humanity's demand for ecological resources and services exceeded what Earth can regenerate in 2023, and our rate of consumption continues to grow. This is increasing pressure on the planet's finite natural resources, creating resource insecurity, and bringing biodiversity loss, pollution, growing emissions, and climate change.



Adopting more sustainable lifestyles and a fair transition will be critical to reaching our climate and nature ambitions, in line with the Sustainable Development Goal on Responsible Consumption and Production (SDG 12). Leading this transition will, however, require significant investment in enabling policies, products, low-carbon, low-footprint alternatives, infrastructure, services, technologies, and capacity building across sectors.

There is an urgent need to move towards more sustainable patterns of consumption and production and to keep materials in circulation. 'Circularity' is a concept where materials are used for as long as possible at the highest possible value. Circularity covers the entire lifecycle of products and materials, from designing products to be long-lasting and repairable to ensuring that materials can be recovered through recycling and thus maintained in the economy at the end of a product's lifecycle. The main goal of circularity is to reduce the harmful environmental and socio-economic impacts of unsustainable consumption and production, which result in reducing consumption-induced environmental degradation and greenhouse gas emissions. The goals of circularity also include avoiding and minimising waste generation. A circular economy provides opportunities for societies by creating green jobs and circular business opportunities.

Our lifestyle choices can influence the transition to circular economic growth. Evidence indicates that two-thirds of greenhouse gas emissions are directly associated with households and lifestyles. Four areas essential to achieving sustainable and low-carbon lifestyles are mobility, housing and energy use, dietary choices, food, and new business models. In these areas, there is space for individual-level impact on sustainability. Under new business models, the fashion industry is in need of a rethink. According to a report by UNEP, over the past 15 years, fashion consumption has more than doubled, while the number of times a garment is worn before being discarded has decreased by 36%. Every second, the equivalent of a garbage truck full of clothes, which amounts to an estimated value of \$460 billion, is thrown away around the world. In light of current consumption trends and estimates, the fashion industry is not yet on the road towards circularity. Action is needed across the textile value chain to increase the sustainability of the current fashion industry.

### **Enhanced focus of G20 nations on Circularity, Sustainable Consumption and Production**

The High-Level Principles on Lifestyles for Sustainable Development, adopted by the G20 during India's presidency, reflect the need for commitments to promote sustainable consumption and production. Along with the G20 Environment and Climate Ministers Meeting outcome document, the High-Level Principles acknowledge the critical role played by the circular economy and resource efficiency in achieving sustainable development. The time is now for collective actions to reduce the global material footprint while meeting basic needs for all. In doing so, it is imperative to create enabling conditions to spark the shift to circular and green economic growth, while catering to different developmental needs and national circumstances.

As a forward-looking approach and to realise the commitments of the G20 nations, an urgent system-wide transformation of current consumption and production patterns is paramount to avoid climate disaster and to achieve the Sustainable Development Goals and other global targets for climate, biodiversity, and pollution. Transformational supply shifts are needed, particularly in high-impact sectors of the

economy (mobility, textiles, plastics, buildings, and construction, among others). Environmental, economic, and social crises must be tackled together, with a speed and scale that match the magnitude of the challenges facing humanity. At the same time, the specific needs of each country must be acknowledged.

### India's proactive measures have potential for transitioning to circular economic growth

The Government of India is putting special emphasis on the importance of the circular economy, resource efficiency, and sustainable consumption and production. India's transition to manufacturing-led growth provides a notable opportunity for integrating circular economy approaches in manufacturing sectors. As per the latest reports, the transition to circular economic growth can generate a net economic benefit of approximately an annual value of USD 624 billion in India by 2050, relative to the business-as-usual scenario. Transitioning to a circular economy can enhance global employment and green jobs: 'As per ILO estimates, global employment could grow by six million jobs by transitioning to a circular economy'.

Some of the initiatives undertaken by India towards the efficient use of resources and circular economic growth include the Draft National Resource Efficiency Policy (2019), the Steel Scrap Recycling Policy, the Vehicle Scrapping Policy, and recently developed sectoral action plans on circular economy.

In addition to the above, the recently notified Guidelines on Extended Producers Responsibility (EPR) on plastic packaging under the Plastic Waste Management Rules 2016 provide a framework to strengthen the circular economy of plastic packaging waste and can enable sustainable plastic packaging by businesses.

India is also a member of the Global Alliance on Circular Economy and Resource Efficiency (GACERE), a coalition of governments willing to work together and advocate for a global, just circular economy transition and more sustainable management of natural resources. GACERE is supported by UNEP and UNIDO and was launched in February 2021, on the margins of the first segment of the fifth United Nations Environment Assembly (UNEA-5.1).

India launched the Resource Efficiency and Circular Economy Industry Coalition, during the 4<sup>th</sup> G20 Environment and Climate Sustainability Working Group (ECSWG) and Environment and Climate Ministers meeting in Chennai, on 27 July 2023. The coalition seeks to enhance collaboration among businesses, facilitate experience sharing, capacity building across sectors and value chains, and enhance actions for the circular economy transition.

Mission LiFE, launched by India in October 2022, is a global movement based on three principles: nudging behaviours towards responsible consumption (demand), enabling markets to respond swiftly to changing needs





destinations to develop concrete solutions to tackle plastic pollution.

It is heartening to see such encouraging measures being taken by the Government of India, which would advance the transition to circular and green economic growth and support in achievement of related Sustainable Development Goals.

(supply), and influencing government and industrial policy to support these initiatives (policy). The Government of India is embedding the importance of sustainable lifestyles in a cross-cutting manner in its policies, and India's updated Nationally Determined Contribution puts emphasis on sustainable lifestyles as a key to combating climate change.

Sustainable tourism can also play a significant role in accelerating the transition to low-carbon and circular business solutions, creating new opportunities in energy generation, reducing transport emissions, and integrating nature-based solutions into tourism activities and operations. 'Travel for Life' a programme aligned with Mission LiFE, aims to bring large-scale behavioural change amongst tourists and tourism businesses, significantly impacting environmental protection and climate action. The New Delhi Leaders' Declaration notes the role of 'Travel for LiFE' in the development of smart destinations that are responsible and sustainable. During the 4<sup>th</sup> Tourism Working Group meeting of G20 held in Goa in June 2023, the Ministry of Tourism, Government of India, in association with UNEP and the UN World Tourism Organization (UNWTO), organised a thematic event titled– 'Towards a circular economy of plastics in tourism – the Global Tourism Plastics Initiative'. The event witnessed the State of Punjab (India), the Central Nodal Agency for Sustainable Tourism, and the Responsible Tourism Society of India joining the Global Tourism Plastics Initiative (GTPI). GTPI aims to unify the tourism sector behind a common vision for a circular economy of plastics and to collaborate with tourism businesses and

UNEP, agency serving as custodian of 8 out of 12 indicators under SDG 12, aims to promote and enable the shift to Sustainable Consumption and Production (SCP) patterns.

The Life Cycle Initiative, Global Opportunities for Sustainable Development Goals (GO4SDGs), the International Resource Panel (IRP), 10-Year Framework of Programmes on Sustainable Consumption and Production, and the Sustainable Consumption and Production Hotspots Analysis Tool (SCP-HAT) are some of the tools, platforms, and frameworks offered by UNEP to support accelerating global action for circularity and sustainable consumption and production.

UNEP, along with partner organisations, works to provide the latest science-based evidence on lifestyles. UNEP's report on '1.5 degree lifestyles: towards a fair consumption space for all', published in 2021, examined the lifestyle carbon footprint in ten of the G20 countries, offering policy recommendations on how to reduce those footprints. It, in India, provides technical support to various Ministries and Departments at the national and subnational levels on mainstreaming circularity and resource efficiency across sectors (energy, textiles, fashion, plastics, and tourism, among others) and in conducting analytical studies and sharing best practices to enable the transition to green economic growth through policy tools. Through cutting-edge science, coordination, and advocacy, we will continue to inspire, inform, and enable nations and peoples to improve their quality of life without compromising that of future generations. □

# ENSURING WOMEN-LED DEVELOPMENT WITH **NARI SHAKTI VANDAN ADHINIYAM**



*“At a time when women are rapidly progressing and taking leadership roles in every sector, it is crucial that our mothers, sisters, our women power contribute the utmost in policy formulation and policy-making. They should not just contribute, but also play significant roles.”*

**- Prime Minister Narendra Modi**

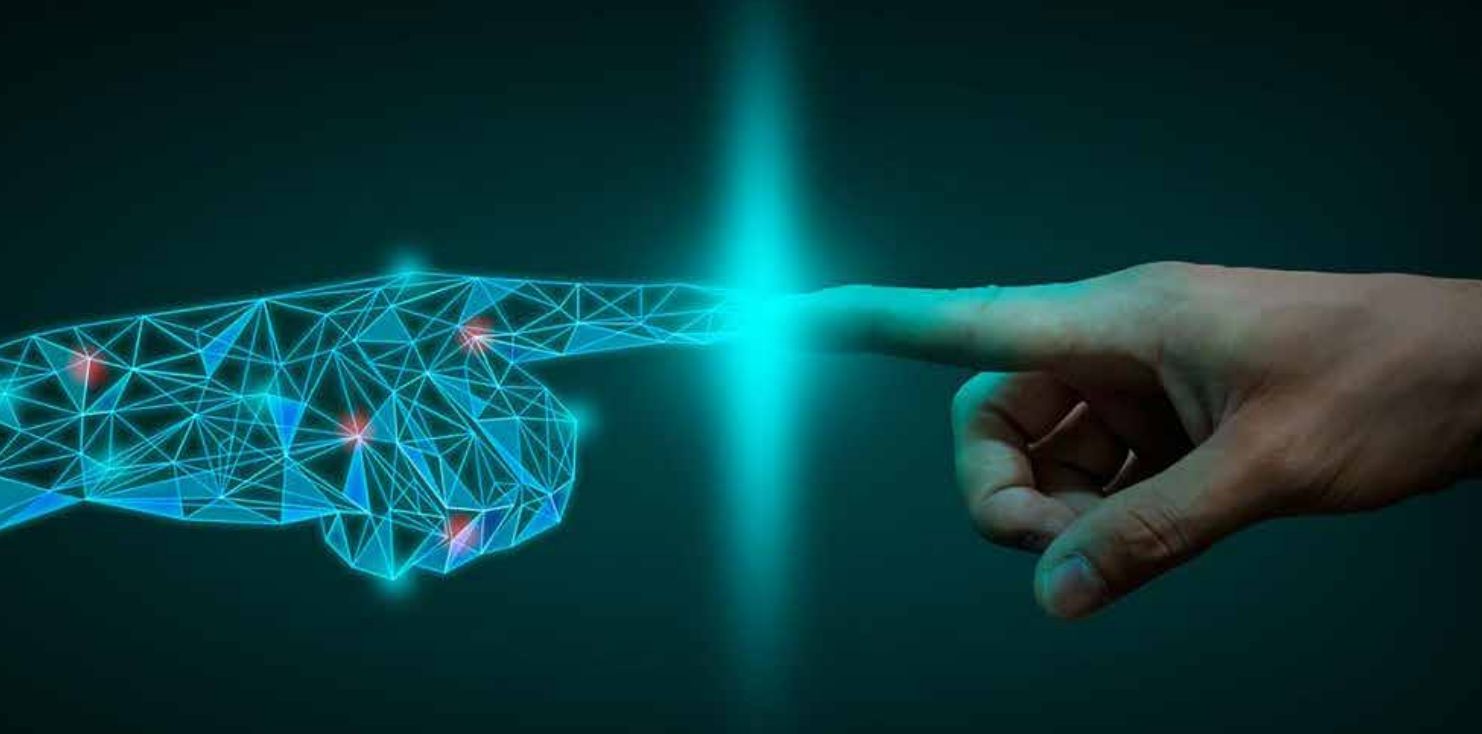
## NARI SHAKTI VANDAN ADHINIYAM: NATION CELEBRATES

- **India's giant leap with** Nari Shakti Vandan Adhiniyam amplifies women empowerment.
- **Empowers her voice** with 33% seats for women in Lok Sabha and State Assemblies.
- **Reservation for SC and ST women** within the reserved quota.
- The Act reaffirms the commitment of Prime Minister Narendra Modi towards **gender equality and inclusivity**.
- This legislation fosters female leadership paving the way for women in **high-stakes decision-making**.

## NARI SHAKTI MARCHING AHEAD

- **Permanent commission** granted to **women officers** in Defence services.
- **Sainik schools now open to girls.**
- **Armed Forces** have **opened entry for women candidates** in **National Defence Academy (NDA)**.
- **First time ever** deployment of rifle women along the LoC in J&K.
- **India has the highest number of female pilots across the world.**
- **Chandrayaan-3**, saw more than **100 women** play a significant role in executing the mission.
- **43% of STEM graduates** in India are women which is **highest** in the world.





# DIGITAL PUBLIC INFRASTRUCTURE & PUBLIC PARTICIPATION

**India's commitment to Digital Public Infrastructure initiatives, exemplified by JAM Trinity, has not only accelerated financial inclusion but also set a benchmark for impartial digital transformation. The Unified Payments Interface (UPI) and other digital endeavours showcase India's leadership in embracing technology to bridge digital divides and promote innovation.**

---

**AKASH TRIPATHI**

The author is the CEO, MyGov. Email: [ceo@mygov.in](mailto:ceo@mygov.in)

---

**I**n a world marked by growing digitalisation, the demand for a strong Digital Public Infrastructure (DPI) has become vitally important, serving as an essential catalyst for enhancing resilience, facilitating service provision, and fostering innovation. The importance lies in cultivating this fundamental framework that caters to diverse sectors, ensuring that humans ranging from urban innovators to rural craftspersons can engage with conviction and credibility, enabling

them to flourish within the digital economy on an equitable basis.

The G20 Leaders' Declaration under India's Presidency on Technological Transformation and Digital Public Infrastructure underlines the central role that technology plays in bridging digital divides and cultivating inclusive and sustainable development. This article shall delve into the key aspects of this declaration and its implications for public participation, emphasising the importance of inclusive, secure, and accountable digital ecosystems.



### DPI in India

The G20 India Presidency was grounded in the central theme of *Vasudhaiva Kutumbakam*, which translates to 'One Earth, One Family, One Future'. This theme emphasised the importance of fair and inclusive economic growth as well as a collective vision for the future. In line with this vision, India plans to build and maintain a Global Digital Public Infrastructure Repository (GDPIR), a digital storage of DPI.<sup>1</sup> In India, the adoption of Digital Public Infrastructures (DPIs) like Aadhaar, alongside Jan Dhan bank accounts and Mobile phones, is recognised to have played a pivotal role in shifting ownership of transaction accounts.<sup>2</sup> The JAM Trinity<sup>3</sup> has accelerated the rate of financial inclusion, increasing it from 25% in 2008 to more than 80% within the past six years.<sup>4</sup> It is estimated that achieving this level of financial inclusion could have taken up to 47 years without the implementation of DPIs.<sup>5</sup> The G20 New Delhi Leaders' Declaration emphasises the importance of safe, secure, and inclusive DPI, which resonates with India's

successful implementation of Aadhaar and the JAM Trinity (Jan Dhan, Aadhaar, and Mobile phones) to accelerate financial inclusion.

### Government-to-Person programmes & Unified Payments Interface

India has established one of the world's largest digital Government-to-Person (G2P) architectures by utilising DPI.<sup>4</sup> This approach has facilitated the transfer of approximately Rs 32.29 trillion directly to beneficiaries across 53 Central Government ministries through 313 key schemes, till date.<sup>6</sup>

Similarly, India's Unified Payments Interface (UPI) stands as a swift and instantaneous payment network within India, with over 10.586 billion transactions, totalling approximately Rs 15.76 trillion, recorded in August 2023.<sup>7</sup> The UPI-Pay Now linking India with 11 countries (France<sup>8</sup>, Singapore, Australia, Canada, Hong Kong, Oman, Qatar, the USA, Saudi Arabia, the UAE, and the United Kingdom<sup>9</sup>) is in line with the G20's focus on financial inclusion. This linkage enables quicker, more cost-effective and transparent cross-border payments. DPIs also hold the

**The G20 India Presidency was grounded in the central theme of *Vasudhaiva Kutumbakam*, which translates to 'One Earth, One Family, One Future'. This theme emphasised the importance of fair and inclusive economic growth as well as a collective vision for the future.**

capacity to revolutionise the way businesses provide their services, capitalising on the advantages of scale, efficiency, and innovation. However, recognising the potential of DPIs in a sustainable manner necessitates effective cooperation between businesses and policymakers.<sup>1</sup>

### India Stack & Account Aggregator (AA) System

India Stack, the fundamental DPI of India, has been effectively utilized to encourage innovation, promote healthy competition, expand market reach, address financial inclusion disparities, bolster government revenue collection, and enhance the efficiency of public expenditure.<sup>11</sup> It has modernised and streamlined the Know Your Customer (KYC) processes. As of the current date, there have been a total of 16.47 billion eKYC transactions conducted, facilitated by 232 eKYC Authentication Agencies (KUA).<sup>12</sup> India's Account Aggregator (AA) system lets people have control over their own financial information. No data can be shared without the individual's consent.<sup>13</sup>

### Key Initiatives

India's initiatives have played a pivotal role in advancing its digital infrastructure, aligning with the G20 Leaders' Declaration on Technological Transformation and Digital Public Infrastructure. Here are some key schemes:

#### 1. Digital India Initiative & BharatNet Project:

The Digital India initiative, launched in 2015, aligns with the G20's commitment to bridging the digital divide. It focuses on providing digital infrastructure and promoting digital literacy, both essential elements highlighted in the G20 declaration. As of 11 September

2023, the *BharatNet* project has successfully linked 202,028 Gram Panchayats, with 658,685 kilometres of optical fibre cables (OFC) installed. Furthermore, 643,789 Fibre-To-The-Home (FTTH) connections have been activated, and 104,675 Wi-Fi hotspots have been deployed to guarantee connectivity to the last mile.<sup>14</sup>

#### 2. Pradhan Mantri Jan Dhan Yojana (PMJDY):

PMJDY has significantly contributed to financial inclusion and digital adoption, key priorities in the G20's emphasis on public participation. As of 13 September 2023, under the PMJDY, the total number of beneficiaries across different types of banks, including public sector banks, regional rural banks, private sector banks, and rural cooperative banks, amounted to 50.41 crore. Among these beneficiaries, 27.98 crore were rural-urban females. The cumulative deposits in their accounts reached a total of Rs 20,494.18 billion, with 34.26 crore Rupay Debit Cards issued to the beneficiaries.<sup>15</sup>

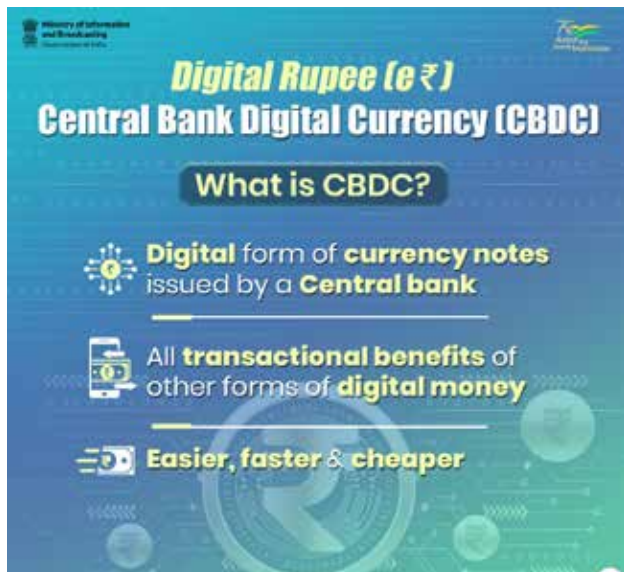
#### 3. Make in India:

The Make in India initiative has bolstered India's self-reliance in technology, reducing dependency on imports. This aligns with the G20's focus on innovation, technology transfer, and fostering a secure digital environment. Including 374,576 business requests and investments in the pipeline totalling \$201.12 billion, it has spurred the production of electronic and digital goods locally, reducing dependency on imports and bolstering the nation's self-reliance in technology. These efforts have also led to the creation of 464,217 actual jobs.<sup>16</sup>

#### 4. Startup India:

Startup India has nurtured entrepreneurship and innovation, which is in line with the G20's commitment to promoting responsible and inclusive use of digital technology. Including 99,380 DPIIT recognised startups and a user base of 664,486 on the Startup India Portal, it provides crucial support to startups, including access to funding, mentorship, and regulatory reforms. As of 31 May 2023, India accommodates 108 unicorns, accounting to a combined





valuation of \$340.80 billion.<sup>17</sup> Startups are contributing significantly to India's digital ecosystem by developing innovative solutions, and these figures highlight the programme's successful impact in fostering entrepreneurship and growth.<sup>18</sup>

5. **Smart Cities Mission:** While primarily an urban development initiative, the Smart Cities Mission integrates digital infrastructure components, aligning with the G20's emphasis on building DPI. The Smart Cities Mission encompasses 100 mission cities, includes 7,934 total projects, and involves a total estimated cost of Rs 170,392 crore.<sup>19</sup> Through these initiatives, it is actively enhancing the digital capabilities of selected cities by implementing projects such as Wi-Fi hotspots, intelligent transportation systems, and data-driven governance solutions. These efforts play a vital role in advancing both the physical and digital aspects of urban living in India's cities.
6. **Aadhaar:** The Aadhaar project plays a crucial role in enabling digital services and identity verification, aligning with the G20's emphasis on data protection, privacy, and secure digital infrastructure. With the most recent statistics indicating 1.38 billion Aadhaar numbers have been generated, 788.64 million Aadhaar records updated, and 100.33 billion authentications, alongside 16.42 billion eKYC processes completed,<sup>20</sup> these figures underscore its

ongoing importance in ensuring the smooth operation of India's digital infrastructure.

7. **UMANG & DigiLocker:** The UMANG app aligns with the G20 Leaders Declaration 2023 by serving as a digital public infrastructure that provides secure and inclusive access to a wide range of government services. With 313 departments and 1,745 services (898 central, 847 state), has 56 million registered users and processed 3.849 billion transactions. This showcases its comprehensive reach and importance as a digital platform streamlining government-citizen interactions in India.<sup>21</sup> Similarly, DigiLocker aims to advance paperless governance by providing citizens with authentic digital documents from various issuers, stored in their locker accounts.<sup>22</sup>
8. **Central Bank Digital Currency (CBDC)<sup>23</sup>:** The launch of ₹-R by the Reserve Bank of India (RBI) is closely aligned with the G20 Leaders Declaration 2023 regarding CBDCs. The G20 leaders' declaration emphasised the importance of exploring the macro-financial implications of CBDCs, especially from the perspective of cross-border payments and their influence on the international monetary system. ₹-R, as a digital token representing legal tender issued by the Reserve Bank of India (RBI), reflects India's hands-on approach to embrace modern



digital currency solutions and bring them into line with global trends in CBDC development and implementation.

**9. Artificial Intelligence (AI)**<sup>24 25</sup>: The Ministry of Electronics and IT (MeitY) has undertaken various schemes and programs to accelerate the implementation and development of AI in India. These initiatives align with the G20 Leaders' Declaration 2023, which emphasises the responsible and inclusive use of AI for the public good. MeitY's efforts include re-skilling/up-skilling IT professionals, online portals, capacity building, research centres, and international collaborations, all of which contribute to responsible AI development. Furthermore, the commitment to promoting responsible AI for achieving Sustainable Development Goals (SDGs) reflects India's dedication to using AI for public benefit and aligns with the global objective of leveraging AI responsibly for the greater good.

## Conclusion

The G20 Leaders' Declaration underscores the pivotal role of Digital Public Infrastructure (DPI) in driving inclusive and sustainable development in an increasingly digital world. India's persistent commitment to DPI initiatives, exemplified by Aadhaar and the JAM Trinity, has not only accelerated financial inclusion but also set a benchmark for impartial digital transformation. The Unified Payments Interface (UPI) and other digital endeavours showcase India's leadership in embracing technology to bridge digital divides and promote innovation.

India's initiatives align closely with the G20's priorities, serving as a model for nations worldwide. The country's success story stands as an inspiration for countries striving to create resilient and inclusive digital futures. The G20 Leaders' Declaration reaffirms the transformative potential of DPIs and underlines their significance in fostering a more equitable and prosperous global digital landscape. □

## References

1. Government of India. (2023). *G20 New Delhi Leaders' Declaration*. New Delhi.
2. The World Bank. (2023). *G20 Policy Recommendations for Advancing Financial Inclusion and Productivity Gains Through Digital Public Infrastructure: Global Partnership for Financial Inclusion 2023*
3. Government of India. *Leveraging the Power of JAM: Jan Dhan, Aadhar, and Mobile*.
4. Press Information Bureau. (2023). G20 document prepared by World Bank lauds India's progress. New Delhi.
5. The World Bank. (2023). *G20 Policy Recommendations for Advancing Financial Inclusion and Productivity Gains Through Digital Public Infrastructure: Global Partnership for Financial Inclusion 2023*
6. Direct Benefit Transfer Mission, Government of India.
7. National Payments Corporation of India. UPI Product Statistics
8. Press Information Bureau. (2023). *English rendering of Press Statement by Prime Minister Shri Narendra Modi at the Joint Press Briefing with the President of France*. New Delhi, India
9. Press Information Bureau. (2023). *Foreign nationals and NRIs visiting India can make payments using Unified Payments Interface (UPI) while in India*. New Delhi, India
10. Mohanty, A. (2023). *The Business Case for DPI*. Carnegie India. New Delhi, India
11. Alonso, C., Bhojwani, T., Hanedar, E., Prihardini, D., Una, G., & Zhabaska, K. (2023). *Stacking up the Benefits: Lessons from India's Digital Journey*. IMF Working Paper No. 23/78, International Monetary Fund, Washington DC
12. Unique Identification Authority of India. AADHAAR Dashboard
13. Press Information Bureau. (2021). *Know all about Account Aggregator Network- a financial data-sharing system*. New Delhi, India
14. Department of Telecommunications, Ministry of Communications, Government of India. BharatNet Project
15. Department of Financial Services, Ministry of Finance, Government of India. Pradhan Mantri Jan-Dhan Yojana
16. Department of Industrial Policy & Promotion, Ministry of Commerce and Industry, Government of India. Invest India
17. Department of Industrial Policy & Promotion, Ministry of Commerce and Industry, Government of India. Invest India. The Indian Unicorn Landscape
18. Department for Promotion of Industry & Internal Trade, Ministry of Commerce and Industry, Government of India. Startup India
19. Ministry of Housing and Urban Affairs, Government of India. National Progress - Smart Cities Mission
20. Unique Identification Authority of India (UIDAI), Ministry of Electronics and Information Technology, Government of India. Aadhar
21. Ministry of Electronics & Information Technology. UMANG
22. Ministry of Electronics & Information Technology. DigiLocker
23. Press Information Bureau. (2023). *Central Bank Digital Currency (CBDC): e₹-R is in the form of a digital token that represents legal tender*. New Delhi
24. Press Information Bureau. (2023). *Artificial Intelligence*. New Delhi
25. Press Information Bureau. (2023). *Generative Artificial Intelligence*. New Delhi.



# **BUILDING SAFETY, SECURITY, RESILIENCE, AND TRUST IN THE DIGITAL ECONOMY**

**India's G20 Presidency has set the agenda for Digital Transformation – DPI, Cyber Security & Digital Skilling. This approach to digital transformation will truly help realise the goal of Vasudhaiva Kutumbakam – One Earth, One Family, One Future – digitally bringing the world together.**

**ABHISHEK SINGH**

The author is the President and CEO at National E-Governance Division, Ministry of Electronics and Information Technology, GoI.  
Email: [ceo@digitalindia.gov.in](mailto:ceo@digitalindia.gov.in)

**G**20, the largest and most impactful economic group in the world, was formed in 1999 in response to the Asian financial crisis of 1997-98 and to create global financial stability. Since its origin, it has expanded its agenda to include inter alia, the digital economy, trade, sustainable development, health, agriculture, energy, environment, climate change, and anti-corruption. The digital economy is one of the most important agenda items for the G20. As per the World Bank, the digital economy contributes to more than 15% of the global Gross Domestic Product (GDP), and in the last ten years, it has been growing two and a half times faster than the physical world GDP.<sup>1</sup>

In the words of Prime Minister Narendra Modi, at the Digital Economy Ministerial Meeting in Bengaluru on 19<sup>th</sup> August, “As the digital economy spreads globally, it will face security threats and

challenges. In this context, it is important to build consensus on the G20 high-level principles for a secure, trusted, and resilient digital economy. We in G20 have a unique opportunity to lay the foundation for an inclusive, prosperous and secure global digital future.”<sup>2</sup>

## **Digital Economy Working Group**

The Digital Economy Working Group had extensive discussions on the three key pillars: Digital Public Infrastructure, Security in the Digital Economy, and Digital Skilling. After extensive negotiations in Lucknow, Hyderabad, Pune, and Bengaluru, the Ministerial Meeting adopted the ‘Outcome’ document, which was unanimously agreed to by all members except for the geopolitical issues that had no direct correlation with digital economy, and the issue was finally resolved at the G20 Delhi Summit in September 2023—a stupendous effort by the Indian G20 negotiating team. The Digital Economy



Outcome Document<sup>3</sup> outlines the details of the consensus that emerged on the key issues.

### Digital Public Infrastructure (DPI)

One key achievement of the G20 was to come up with a definition of DPIs: Digital Public Infrastructure is described as a set of shared digital systems that should be secure and interoperable, can be built on open standards and specifications to deliver and provide equitable access to public and/or private services at a societal scale, and are governed by applicable legal frameworks and enabling rules to drive development, inclusion, innovation, trust, and competition and respect human rights and fundamental freedoms. DPI was seen as a promising approach to digital transformation by providing a shared technology infrastructure that can be built and leveraged by both the public and private sectors. It was also agreed upon that governance frameworks and institutional capabilities play a very important role in ensuring that DPI is safe, secure, trusted, accountable, and inclusive and can contribute immensely to achieving the Sustainable Development Goals (SDGs). One of the most important outcomes of the G20 was the agreement reached about the G20 Framework for Systems of Digital Public Infrastructure that can lay the roadmap for the development and deployment of DPIs in Low- and Middle-Income Countries (LMICs). The contribution made by India Stack, especially, Aadhaar, UPI, and Digilocker in India's Digital Transformation Story was acknowledged in a way when the G20 outcome document mentioned the significance of privacy and data protection in accordance with legal frameworks and highlighted key DPI elements like digital identity, digital payment systems, and data-sharing mechanisms for secure

identification, reliable payments, and seamless data exchange across various sectors. India's plan to build and maintain a Global Digital Public Infrastructure Repository (GDIPR) as a virtual repository of DPI, voluntarily shared by G20 members and other nations, can be a big enabler for the adoption of DPIs and is expected to be a key action item post-G20. This, accompanied by the proposal of the One Future Alliance (OFA), can help build capacity and provide technical assistance and funding support for implementing DPIs in LMICs.

### Security in the Digital Economy

Building safety, security, resilience and trust in the digital economy has emerged as one of the key priorities of all G20 members that can ensure an enabling, inclusive, open, fair, non-discriminatory, and secure digital economy. This is essential for continuing the momentum in the growth of the digital economy while ensuring that the key principles of promoting safety, trust, reliability, resilience, and protecting privacy and data remain a top priority and key focus area. Trust and security as an essential prerequisite for harnessing the potential of the digital economy have been on top of the agenda right from the 2017 German G20 Presidency, and these values have been reiterated in 2018, 2019, and 2020 under the Argentine, Japanese, and Saudi Arabian G20 Presidencies, respectively. The 2020 Saudi Arabian Presidency and the 2021 Italian Presidency recognised that security in the digital economy is a key enabling factor for sustainable development and growth. Deliberations in India's G20 Presidency further emphasised the importance of safety, security, resilience, and trust in the digital economy for digital transformation. In today's interconnected world, there are digital dependencies across sectors and borders that can create security risks associated with the digital economy that a single entity may not be capable of addressing alone. The digital economy has multiple layers, and, therefore, there is a risk that breaches or incidents at any layer may disrupt the functioning of the whole ecosystem. Due to the borderless nature of the digital environment, the global community needs to work together towards building a safe, secure, and resilient digital economy. Preventing and mitigating security threats to the digital economy requires augmenting the capacity of all key stakeholders to understand, anticipate, prepare for, and respond to these threats. To operationalise this approach of

addressing shared security risks and challenges, the non-binding G20 High-Level Principles to Support Businesses in Building safety, security, resilience, and trust in the digital economy will be a key enabler. These principles have been developed from the best practices, strategies, and tools developed and implemented by G20 members. These principles seek to strengthen resilience in the digital economy by promoting a culture of security, capacity building, multi-stakeholder cooperation, and supporting research and development.

The G20 High-Level Principles to Support Businesses in Building safety, security, resilience, and trust in the Digital Economy can be summarised as under:

## 1. Security and Trust

A human-centric culture of security and trust in the digital economy that enables citizens and businesses to understand risk management can be developed by

- Promoting cyber hygiene and the development of market-led and industry-led standards based on the principles of openness, transparency, and consensus.
- Encouraging businesses and supporting MSMEs to develop and implement good practices and risk management frameworks to maintain the integrity of global supply chains.
- Promoting a 'security by design' and phased risk management approach along with encryption measures for digital solutions and services, including emerging technologies and

connected systems and their devices.

- Promoting resilience in connected sectors such as health, finance, manufacturing, and public services and utilities by taking suitable security measures.
- Encouraging accessible and efficient grievance redressal mechanisms for businesses, MSMEs, and consumers that fall victim to malicious use of digital technologies.

## 2. Capacity Building

Capacity building is an important aspect of advancing security across the multi-layered structure of the digital economy and should include

- Collaborating with and encouraging relevant stakeholders, including international organisations, to prioritise and contribute to capacity building within their areas of expertise.
- Exploring an interdisciplinary approach that includes strategy, governance, technology, regulatory and non-regulatory frameworks, culture, economics, incident response, and crisis management.
- Providing guidance and awareness to citizens, businesses including MSMEs, and the wider economy on how to stay safe and secure online in an inclusive and accessible manner.
- Promoting lifelong learning opportunities for all users of digital technologies.
- Encouraging young people especially women and girls to consider a career in security of digital solutions and services through curricular or extracurricular programmes.

## 3. Research and Development

Advancing research and development enables building resilience by

- Promoting research in advanced and emerging technologies that can enhance protection against security threats.
- Sharing best practices on how to tackle various security threats, including recommendations from international organisations.
- Facilitating research projects on topics such as the economic costs of security incidents and their impact on businesses and underrepresented communities.



- Promoting studies to measure security-related digital divides and its impact on economies.

#### 4. Multistakeholder Cooperation

Partnering with businesses, civil society organisations, academia, international organisations and the technical community is key to promoting security in the digital economy and this can be reinforced by

- Developing opportunities for public-private partnership collaboration and engagement.
- Supporting the sharing of trends on known and existing vulnerabilities faced by nongovernmental stakeholders in the digital environment.
- Facilitating engagement between businesses and points of contact across various industry incident response teams.

#### 5. Strengthening Resilience of Essential Services

Prevention of damage or disruption to certain essential social and economic services in the digital economy is important, and it is essential that stakeholders are encouraged to

- Take suitable measures to protect services essential to the digital economy from security threats.
- Encourage businesses to set up mechanisms to assess the security of their supply chains for essential services in an evidence-based approach.

#### 6. Support for MSMEs in the Security Ecosystem

MSMEs have a very important role to play in the digital economy and the MSME security ecosystem can be strengthened by

- Driving innovation by supporting MSMEs that offer security solutions and services to scale up and grow.
- Providing guidance and support to MSMEs on how to operate securely in a digital environment.
- Creating opportunities for MSMEs to engage with governments, shape policy approaches, and share good practices to improve resilience to combat particular security challenges.
- Seeking to mobilise additional cooperation, funding, and support for MSMEs to improve their security capacity.

Another key aspect of the potential risks associated with the digital economy relates to the impact they have on vulnerable sections of society, in particular children and youth. On one hand, increased access to digital tools and services opens up new avenues for children and youth to explore their creativity, enhance their learning experience, and work collaboratively. At the same time, it also increases exposure to risks to which children are especially vulnerable, such as cyber bullying and grooming, child sexual abuse and exploitation, as well as risks related to their data and privacy. Women and girls are disproportionately affected by technology-facilitated gender-based violence. Cyber education and cyber awareness for the protection and empowerment of children and youth in today's digital age is a key priority area and requires concerted action by all stakeholders. The G20 Toolkit on Cyber Education and Cyber Awareness of Children and Youth, developed under the Indian presidency, will serve as a guide for all countries. It recognises the important role of the UN Convention on Rights of the Child and the need to develop holistic, human-centric approaches to address online safety across different jurisdictions that promote respect for and facilitate governments' efforts to protect children's privacy and personal data, uphold children's dignity, and respect their rights. This coordinated approach to ensuring the safety of women, children, and youth will go a long way in building safety, trust, and resilience in the digital economy.

This approach adopted by the G20 member countries under India's Presidency lays down the roadmap for our common digital future, a strategy that not only lays emphasis on the adoption of Digital Public Infrastructure for enabling better access to public services for all, empowering people, and enabling a robust digital economy but it also addresses the key issues and challenges relating to safety, security, and trust. This approach to digital transformation will truly help realise the goal of *Vasudhaiva Kutumbakam* – One Earth, One Family, One Future – digitally bringing the world together. □

#### References

1. <https://www.worldbank.org/en/topic/digitaldevelopment/overview>
2. <https://www.pmindia.gov.in/en/pms-speeches/>
3. [https://www.g20.org/content/dam/gtwenty/gtwenty\\_new/document/G20\\_Digital\\_Economy\\_Outcome\\_Document%20\\_and\\_Chair%27s\\_Summary\\_19082023.pdf](https://www.g20.org/content/dam/gtwenty/gtwenty_new/document/G20_Digital_Economy_Outcome_Document%20_and_Chair%27s_Summary_19082023.pdf)



# RESPONSIBLE USE OF AI BRIDGING INNOVATION AND ETHICS

**The New Delhi Leaders' Declaration highlights the significance of harnessing 'AI responsibly for good and for all'. It states that the G20 leaders are committed to leveraging AI for the public good by solving challenges in a responsible, inclusive, and human-centric manner while protecting people's rights and safety. Groupings like these are in an opportune position to take the lead in this regard, thereby bridging the gap between innovation and the ethics of the use of AI.**

---

**DR SAMEER PATIL**

The author is a Senior Fellow and Deputy Director at the Observer Research Foundation (ORF). He works at the intersection of technology and national security. Email: [sameer.patil@orfonline.org](mailto:sameer.patil@orfonline.org).

---

**SHIMONA MOHAN**

The co-author is a Junior Fellow at the Centre for Security, Strategy and Technology, ORF. She works at the intersection of security, technology (especially AI and cybersecurity), gender and disarmament. Email: [shimona.mohan@orfonline.org](mailto:shimona.mohan@orfonline.org).

---

**A**rtificial Intelligence (AI) is transforming the way humans interact, industries function, and societies are structured. The seemingly limitless potential of AI across multiple domains, countries, and human imaginations has spawned numerous applications. Current applications include image and text analysis for data analysis purposes, logistics, assistance in decision-making, autonomous vehicles, and aerial systems, cybersecurity, etc.

Additionally, it is being used for security, surveillance, and inventory management. It is also being applied extensively to areas like agriculture, fintech, healthcare, manufacturing, and climate change, yielding sizeable dividends in all of them.

It has become abundantly clear in the recent past that AI can augment human capabilities and aid us in tackling some of the most pressing challenges of our time. AI is a force that has the



capacity to create a more sustainable, equitable, and interconnected world. However, it also raises critical ethical and societal concerns, which require adequate policy consideration and responses. This highlights the need for the responsible development and deployment of AI to ensure that its transformative power benefits everyone and leaves no one behind.

### **G20 New Delhi Leaders' Declaration and Responsible AI**

States are increasingly being compelled to practise responsible behaviour in their engagements with AI for civilian, security and defence purposes. In this context, the recently concluded G20 Summit in New Delhi (9-10 September 2023) has tackled multiple aspects related to Responsible AI (RAI). Most of the G20 members have been working towards establishing regulations for the responsible use of AI, especially since the advent of GenAI applications. The European Union's proposed AI Act is the most comprehensive attempt to establish a regulatory framework for the responsible development of AI that focuses primarily on strengthening rules around data quality, transparency, human oversight, and accountability.<sup>1</sup>

The New Delhi Leaders' Declaration highlights the significance of harnessing 'AI responsibly for

good and for all'.<sup>2</sup> It states that the G20 leaders are committed to leveraging AI for the public good by solving challenges in a responsible, inclusive, and human-centric manner, while protecting people's rights and safety. It adds that to ensure responsible AI development, deployment and use, the protection of human rights, transparency and explainability, fairness, accountability, regulation, safety, appropriate human oversight, ethics, biases, privacy, and data protection must be addressed. In addition, the declaration mentions that the G20 members will pursue a pro-innovation regulatory/governance approach that maximises the benefits and takes into account the risks associated with the use of AI.

The declaration also reaffirms the leaders' commitment to G20 AI Principles of 2019. These principles had been adopted at the 2019 Osaka Summit and underline the human-centred approach of AI.<sup>3</sup> They take a cue from the Organisation for Economic Cooperation and Development principles on AI, also adopted in 2019, that support the technology to become innovative and trustworthy, and respect human rights and democratic values.<sup>4</sup> Besides this, the declaration also underlines the importance of investment in supporting human capital development. Towards this, G20 leaders agreed to extend support to educational institutions and teachers to enable them to keep pace with emerging trends and technological advances including AI. This will play an important role in imparting skills for the youth entering the job market and will offset the concerns around the adverse economic impacts of AI.

### **How does AI pose Ethical Risks?**

According to the AIAAIC (AI, Algorithmic, and Automation Incidents and Controversies) database, which tracks incidents related to the ethical misuse of AI, the number of AI incidents and controversies has increased 26 times since 2012.<sup>5</sup>

Several critics of AI have also raised concerns about gender and racial bias when it comes to the application of AI to services like healthcare and finance. Although it may appear to be so, AI is not neutral; it can internalise and then catastrophically enhance biases that societies possess, programme them into the code, and/or ignore them in outputs

in the absence of sensitivities to those biases, to begin with.<sup>6</sup> If the datasets used in developing any AI system are incomplete or skewed towards or against a sub-group, they will produce results that marginalise those sub-groups or make them invisible in some way. Yet, even if a dataset is precise and representative of the intended population, biased Machine Learning (ML) algorithms applied to the data may still result in biased outputs.

In most supervised ML models, training datasets are given labels by a human developer or coder to enable the ML model to classify the information it already has. The model then characterises new information given to it based on this classification syntax, after which it generates an output. There are two possible modes of bias introduction in this process: first, if the human developers have their own biases, which they either introduce into the system or retain due to ignorant oversight; and second, if biases are incorporated in the processing of the data within the 'black box' of the AI/ML system, that is not explainable to or understandable by human operators.<sup>7</sup> The black box, as the name suggests, makes the learning process of the system opaque, and its algorithms can thus only be fixed once an output is generated and the human developer affirms that there was a problem with processing the input data.

Besides this, there are also ethical concerns that have arisen over issues like copyright infringement and privacy violations due to apps that create

realistic images and art from a description in natural language.<sup>8,9</sup> Several artists have accused apps of training their algorithms based on images and illustrations scraped from the web without the original artists' consent.<sup>10</sup>

Then there are concerns regarding the misuse of AI in the defence domain to enhance targeting and surveillance capabilities of drones on the battlefield. This is a use-case of AI in drone warfare with the potential of ensuing violence. In other cases, critics have also noted the misuse of AI for illegal surveillance. In the cybersecurity sphere, generative AI applications are increasingly posing legitimate security threats as they are being used to conduct malware attacks. For instance, cybercriminals, with the help of AI, mass generating phishing emails to spread malware and collect valuable information. These phishing emails have higher rates of success, than manually crafted phishing emails. However, an even more insidious threat has emerged through 'deepfakes,' which generate synthetic or artificial media using ML. Such realistic-looking content is difficult to verify and have become a powerful tool for disinformation, with grave national security implications. For instance, in March 2022, a deep fake video of Ukrainian President Volodymyr Zelenskyy asking his troops to surrender went viral among Ukrainian citizens, causing significant confusion, even as their military was fighting against the Russian forces.<sup>11</sup>

Beyond defence and security, AI has also evoked fears of adverse economic impact. An emerging apprehension is that AI automation could potentially alter the labour market in a fundamental manner, with grave implications for economies in the Global South that rely on their labour and human resources.<sup>12,13</sup>

### What is Responsible AI?

These dynamics have created the necessity for the 'Responsible AI' (RAI) and the need to regulate it. There has been a gradual momentum around rallying for responsible innovation ecosystems. This is especially valid in the development and deployment of AI, where there is a chance for responsible innovation and use to be institutionalised right from the get-go and not as an afterthought or a checkbox to performatively satisfy policy and/or compliance-





related constraints. In this context, RAI is broadly understood as the practice of designing, developing, and deploying AI to empower employees and businesses and impact society in a fair manner. Given AI's dual-use character, this is a loose and flexible understanding, and it posits RAI as an umbrella term that usually encompasses considerations around fair, explainable, and trustworthy AI systems.

India has been working on RAI since 2018, and NITI Aayog also released a two-part report in 2021 on approaches towards<sup>14</sup> and operationalisation of<sup>15</sup> RAI principles for the deployment and use of civilian AI architectures. The seven principles that NITI Aayog highlights are: safety and reliability; equality; inclusivity and non-discrimination; privacy and security; transparency; accountability; and protection and reinforcement of positive human values. It also recommends measures for the government, industry bodies, and civil society to implement these principles in the AI products they develop or work with. Indian tech industry body NASSCOM embedded the principles of this framework into India's first RAI Hub and Toolkit<sup>16</sup>

released in late 2022, which comprises sector-agnostic tools to enable entities to leverage AI by prioritising user trust and safety.

Pertinently, the focus on RAI in G20 New Delhi Leaders' Declaration also aligns with India holding the chair of the Global Partnership on Artificial Intelligence (GPAI), a multistakeholder initiative that brings together experts from science, industry, civil society, international organisations, and governments.<sup>17</sup> It contributes to the responsible development of AI via its Responsible AI working group.<sup>18</sup> India chairing the GPAI is important since the Global South is underrepresented in the forum: out of its 29 members, only four are from the Global South - Argentina, Brazil, India, and Senegal. Therefore, India is better positioned to play an active role in bridging this divide and ensuring that the less developed economies also get to reap the benefits of this technological shift towards AI. New Delhi will host the annual GPAI Summit on 12-14 December 2023. At the last year's summit in Tokyo, India urged the members to work together on a common framework of rules and guidelines on data governance in order to prevent user harm and ensure the safety of both the internet and AI.

## Conclusion

Though the rise of AI and its applications in the past few years has been meteoric and the scope for innovation in the field is endless, nations all around the world are waking up to the dangers of its potential misuse. While there are several initiatives attempting to address the issue, there is currently no global consensus or regulatory framework on the ethical and responsible use of AI. Hence, groupings like the G20 and GPAI are in an opportune position to take the lead in this regard, thereby bridging the gap between innovation and the ethics of AI use. The G20 New Delhi Leaders' Declaration demonstrates that leaders of the world's largest economies are aware of the potential benefits and risks of AI and are committed to working together to ensure that the technology is developed and used in a responsible and inclusive manner. The G20 members must follow this declaration by adopting the anticipatory regulation approach, doing over-the-horizon thinking, and building a coalition of diverse stakeholders. □

## References

1. "EU AI Act: first regulation on artificial intelligence," June 14, 2023, <https://www.europarl.europa.eu/news/en/headlines/society/20230601STO93804/eu-ai-act-first-regulation-on-artificial-intelligence>.
2. G20 New Delhi Leaders' Declaration, September 9-10, 2023, [https://www.g20.org/content/dam/gtwenty/gtwenty\\_new/document/G20-New-Delhi-Leaders-Declaration.pdf](https://www.g20.org/content/dam/gtwenty/gtwenty_new/document/G20-New-Delhi-Leaders-Declaration.pdf).
3. G20 AI Principles, [https://www.mofa.go.jp/policy/economy/g20\\_summit/osaka19/pdf/documents/en/annex\\_08.pdf](https://www.mofa.go.jp/policy/economy/g20_summit/osaka19/pdf/documents/en/annex_08.pdf).
4. "OECD AI Principles overview," <https://oecd.ai/en/ai-principles>.
5. Artificial Intelligence Index Report 2023, Stanford University Human-Centred Artificial Intelligence, [https://aiindex.stanford.edu/wp-content/uploads/2023/04/HAI\\_AI-Index-Report-2023\\_CHAPTER\\_3.pdf](https://aiindex.stanford.edu/wp-content/uploads/2023/04/HAI_AI-Index-Report-2023_CHAPTER_3.pdf).
6. Shimona Mohan, "Filling the Blanks: Putting Gender into Military A.I.," ORF Issue Brief No. 655, August 2023, Observer Research Foundation, <https://www.orfonline.org/research/filling-the-blanks-putting-gender-into-military-ai/>.
7. Shimona Mohan, "Gender-ative AI: An enduring gender bias in generative AI systems," Observer Research Foundation, April 27, 2023, <https://www.orfonline.org/expert-speak/gender-ative-ai/>.
8. DALL·E2, <https://openai.com/dall-e-2>.
9. Midjourney, <https://www.midjourney.com/home/>.
10. James Vincent, "AI art tools Stable Diffusion and Midjourney targeted with copyright lawsuit," *The Verge*, January 16, 2023, <https://www.theverge.com/2023/1/16/23557098/generative-ai-art-copyright-legal-lawsuit-stable-diffusion-midjourney-deviantart>.
11. The Telegraph, "Deepfake video of Volodymyr Zelensky surrendering surfaces on social media," March 17, 2022, <https://www.youtube.com/watch?v=X17yrEV5sl4>.
12. Ian Shine and Kate Whiting, "These are the jobs most likely to be lost – and created – because of AI," *World Economic Forum*, May 4, 2023, <https://www.weforum.org/agenda/2023/05/jobs-lost-created-ai-gpt/>.
13. Accenture, "A new era of generative AI for everyone," <https://www.accenture.com/content/dam/accenture/final/accenture-com/document/Accenture-A-New-Era-of-Generative-AI-for-Everyone.pdf>.
14. NITI Aayog, "RESPONSIBLE AI #AIFORALL: Approach Document for India Part 1 – Principles for Responsible AI," February 2021, <https://www.niti.gov.in/sites/default/files/2021-02/Responsible-AI-22022021.pdf>.
15. NITI Aayog, "RESPONSIBLE AI #AIFORALL: Approach Document for India: Part 2 - Operationalizing Principles for Responsible AI," August 2021, <https://www.niti.gov.in/sites/default/files/2021-08/Part2-Responsible-AI-12082021.pdf>.
16. INDIAai, "NASSCOM launched the Responsible AI hub and resource kit," October 11, 2022, <https://indiaai.gov.in/news/nasscom-launched-the-responsible-ai-hub-and-resource-kit>.
17. Prateek Tripathi, "India's chairmanship of the Global Partnership on AI," Observer Research Foundation, August 8, 2023, <https://www.orfonline.org/expert-speak/indias-chairmanship-of-the-global-partnership-on-ai/>.
18. The Global Partnership on Artificial Intelligence, "Working Group on Responsible AI," <https://gpai.ai/projects/responsible-ai/>.

## Sales Outlets of Publications Division

New Delhi	Soochna Bhawan, CGO Complex, Lodhi Road	110003	011-24365609 011-24365610
Navi Mumbai	701, B Wing, 7th Floor, Kendriya Sadan, Belapur	400614	022-27570686
Kolkata	08, Esplanade East	700069	033-22486696
Chennai	'A' Wing, Rajaji Bhawan, Basant Nagar	600090	044-24917673
Thiruvananthapuram	Press Road, Near Government Press	695001	0471-2330650
Hyderabad	204, II Floor CGO Towers, Kavadiguda, Secunderabad	500080	040-27535383
Bengaluru	I Floor, 'F' Wing, Kendriya Sadan, Koramangala	560034	080-25537244
Patna	Bihar State Co-operative Building, Ashoka Rajpath	800004	0612-2675823
Lucknow	Hall No 1, II Floor, Kendriya Bhawan, Sector-H, Aliganj	226024	0522-2325455
Ahmedabad	4-C, Neptune Tower, 4th Floor, Nehru Bridge Corner, Ashram Road	380009	079-26588669



# ENERGY TRANSITION IN INDIA

**India's journey from conventional to renewable sources of electricity generation marks a monumental step towards a sustainable energy future. The Government's unwavering commitment to ambitious renewable energy targets, coupled with innovative policies and incentives, has set the stage for a greener energy landscape.**

**BHUPINDER SINGH BHALLA**

The author is the Secretary, Ministry of New & Renewable Energy, GoI. Email : secy-mnre@nic.in

**I**ndia stands at a crossroads of development, grappling with the dual challenge of meeting its soaring energy demands while addressing the pressing concerns of climate change and environmental degradation. With a population of over 1.4 billion and being the fastest-growing major economy, the need for a sustainable and secure energy supply has never been more critical for the country. In recent years, India has embarked on a transformative journey, shifting its focus from conventional fossil fuel-led growth towards sustainable growth through renewable sources of electricity generation. This transition not only promises a cleaner and greener energy landscape but also holds the potential to reshape the country's energy future. This article delves into the motivations behind India's energy transition, explores the progress made so far, highlights the

challenges encountered, and envisions the path forward towards a renewable-powered India.

## **The Need for Energy Transition**

For decades, the energy sector has relied primarily on fossil fuels like coal, oil, and natural gas to generate electricity and fuel its economic growth. However, this reliance has come at a significant cost, both environmentally and socially. The burning of fossil fuels releases greenhouse gases into the atmosphere, contributing to global warming and climate change. Additionally, the air pollution resulting from conventional energy sources has led to severe health implications for the population, affecting not only the quality of life but also the economy.

As a signatory to the Paris Agreement, India has committed to reducing its carbon emissions and playing its part in combating climate change.



Recognising the environmental hazards posed by fossil fuels and the need for energy security, India has embarked on an ambitious journey to transition from conventional energy sources to renewable ones.

The Government of India has displayed a strong commitment to advancing the adoption of renewable energy through comprehensive policies and initiatives. The National Action Plan on Climate Change (NAPCC), introduced in 2008, laid the groundwork for the country's sustainable development goals. Under the NAPCC, several national missions were launched, each focusing on a specific sector that contributes to climate change mitigation and adaptation.

Among these missions, the launch of the National Solar Mission has been a watershed moment in the renewable energy story of the country. Launched in 2010, this mission aimed to promote the deployment of solar energy technologies and reduce the cost of solar power generation. The initial target of 20 GW by the year 2022 was increased fivefold to 100 GW. The total target for renewable energy was also revised to 175 GW. The target has recently been revised to 500 GW of installed electricity generation capacity through non-fossil fuels by the year 2030. This reflects the speed and scale at which the Government intends to move from conventional energy sources to

renewables.

Against the target of 175 GW, a total of 172 GW of renewable capacity has been installed by the end of FY 2023, an increase of 126% from 76 GW in FY 2014. Further, installed solar capacity has increased by approx. 200% with the addition of about 45 GW, and installed wind capacity has increased by 9 GW during the period. The share of renewable energy in the generation mix increased from 17.2% in FY 2014 to 22.5% in FY 2023. During this period, the power sector in India has also attracted USD 78 billion in investment, including over USD 10 billion through FDI. The Government has also provided a budgetary support of over Rs 20,000 crore during the period.

Today, India has the 4<sup>th</sup> highest installed RE capacity globally. India also ranks 4<sup>th</sup> in terms of global wind and bioenergy installed capacity, while it ranks 5<sup>th</sup> in solar installed capacity, closely following Germany. During the last five years (2017-22), a RE capacity of 63 GW has been added, which is the 3<sup>rd</sup> highest globally during that period.

In the last five years, 70 GW of solar projects and 21 GW of wind projects (including hybrid projects) have been bid out. Standard bidding guidelines for solar and wind energy projects have also been issued to streamline the bidding process. Further, to increase renewable energy consumption, the Renewable Purchase Obligation (RPO) and Energy Storage Obligation (ESO) trajectory till FY 2030 have been issued by the Government. Green Open Access and Green Power Markets have also been introduced to help in the evacuation of power generated through renewable energy sources.

To achieve the ambitious target of 500 GW of capacity from non-fossil sources, it is also imperative to ensure the evacuation of generation of generated power by building adequate distribution and transmission infrastructure. Under Phase 1 of the Green Energy Corridor (GEC) scheme launched by the Government, 8857 ckm transmission lines and 20868 MVA substations capacity have been completed. Phase 2 of the scheme has been launched for 7 States with a target of 10,750 ckm transmission lines and 27500 MVA substations capacity by 2026. The Government also extended the benefit of Inter State Transmission System (ISTS) charges waiver till June 2025 for all renewable energy projects; for Green Hydrogen Projects

waiver has been extended till December 2030; and for offshore wind projects, it has been extended till December 2032.

A number of important schemes and targets have been announced for the promotion of solar energy: Solar Parks Scheme with a target of 40 GW; Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyaan (PM-KUSUM) Scheme with a target of 30.8 GW; Rooftop Solar (RTS) Phase-2 Scheme with a target of 4 GW; and CPSU Scheme (Ph-1 & 2) with a target of 8.2 GW. The Government has also launched the National Green Hydrogen Mission (NGHM) in January 2023 with a target of 5 MMTPA production capacity by 2030. Till date, 49 green hydrogen production and 19 electrolyser manufacturing projects have been announced so far. It has also announced schemes to incentivise green hydrogen production and electrolyser manufacturing.

Going with the theme of *Atmanirbhar Bharat*, the Government has also focused on the establishment of indigenous manufacturing capacity. Solar PV module manufacturing capacity has increased from 10 GW in 2018 to 25 GW (150%

**The National Action Plan on Climate Change (NAPCC), introduced in 2008, laid the groundwork for the country's sustainable development goals. Under the NAPCC, several national missions were launched, each focusing on a specific sector that contributes to climate change mitigation and adaptation.**

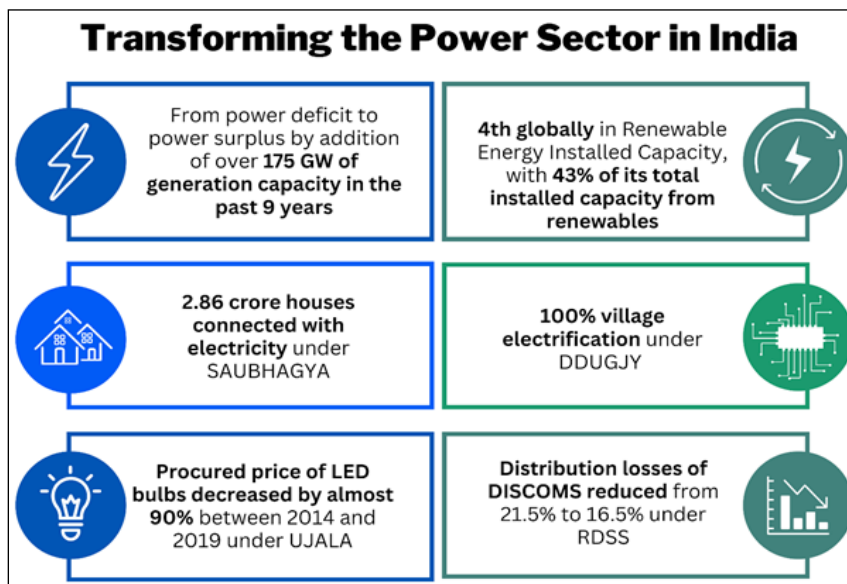
increase) in 2023, and solar PV cell manufacturing capacity has doubled from 3 GW to 6 GW during the same period. To further boost indigenous manufacturing, manufacturing linked tenders (3 GW solar cell & 3 GW solar module) have been issued. One of the major initiatives in renewable energy manufacturing sector is the launch of Production Linked Incentive (PLI) scheme with 8737 MW capacity (fully integrated), awarded under tranche-1 and 39,600 MW capacity (fully/ partially integrated) awarded under tranche-2. Besides these, domestic content linked schemes (CPSU Scheme, PM-KUSUM and RTS

Scheme) and Basic Custom Duty (BCD) on solar modules & cells have been introduced to give the needed fillip to local manufacturing. A total of 75 GW of solar module manufacturing capacity and 55 GW of solar cell manufacturing capacity annually is likely to be achieved by the year 2026. Wind turbine manufacturing capacity of more than 15 GW per annum with 70-80% indigenisation level has been developed in the country.

To improve skilling in the sector, over 32,000 persons have been trained under *Suryamitra* programme. *Vayumitra* for wind power projects and *Jal-Urjamitra* for small hydro plants have also been launched and training programmes are underway.

### Challenges and the Path Ahead

While India's energy transition has been remarkable, it is not without challenges. One of the primary concerns is the intermittent nature of renewable energy sources like solar and wind. Balancing electricity supply and demand becomes complex due to fluctuations in generation. The adoption of advanced energy storage technologies, such



as batteries and pumped hydro storage, is essential to store excess energy during peak generation periods and release it during low-generation times.

Moreover, the integration of renewable energy into the existing grid infrastructure requires significant investments and upgrades. The development of a robust transmission network capable of handling intermittent and decentralised energy sources is crucial to maintaining grid stability and reliability.

Following challenges have been witnessed in the implementation of RE schemes and programmes:

- i. **Land:** The availability of land for RE projects has been one of the major challenges. The preparation of State Renewable Energy Plans, considering the land available, can address this issue.
- ii. **Regulatory Issues:** To achieve the RE installation targets, earnest action is needed from the State Governments on the following aspects:
  - Compliance of Renewable Purchase Obligation (RPO)
  - Timely adoption of tariff by State Electricity Regulatory Commissions (SERCs)
  - Avoiding levy of additional charges by the States
- iii. **Transmission infrastructure:** Realistic transmission and RE project planning coupled with regular monitoring and remedial actions are needed to achieve the targets.

### Economic and Environmental Implications

The transition to renewable sources of electricity generation carries numerous economic and environmental implications. On the economic front, the growth of the renewable energy sector would stimulate job creation, spur technological innovation, and attract foreign investment, as also described in the previous sections. Further, a decrease in fossil fuel imports would enhance energy security and reduce the vulnerability of

**India's transition to renewable energy sources is not just an energy transformation but a commitment to securing a cleaner, more sustainable, and prosperous future for its citizens.**

the economy to global energy market fluctuations.

Environmentally, the shift away from fossil fuels significantly reduces carbon emissions, mitigates air pollution, and safeguards public health. During COP26 in Glasgow, the Prime Minister of India, announced five nectar elements, the *Panchamrit*, to deal with this challenge of climate change. These elements of *Panchamrit* will help the

country to make its contribution in dealing with the climate change emergency. The above discussions reflect that India's commitment to renewable energy aligns with its international climate pledges and also enhances its reputation as a global leader in this aspect.

### Conclusion

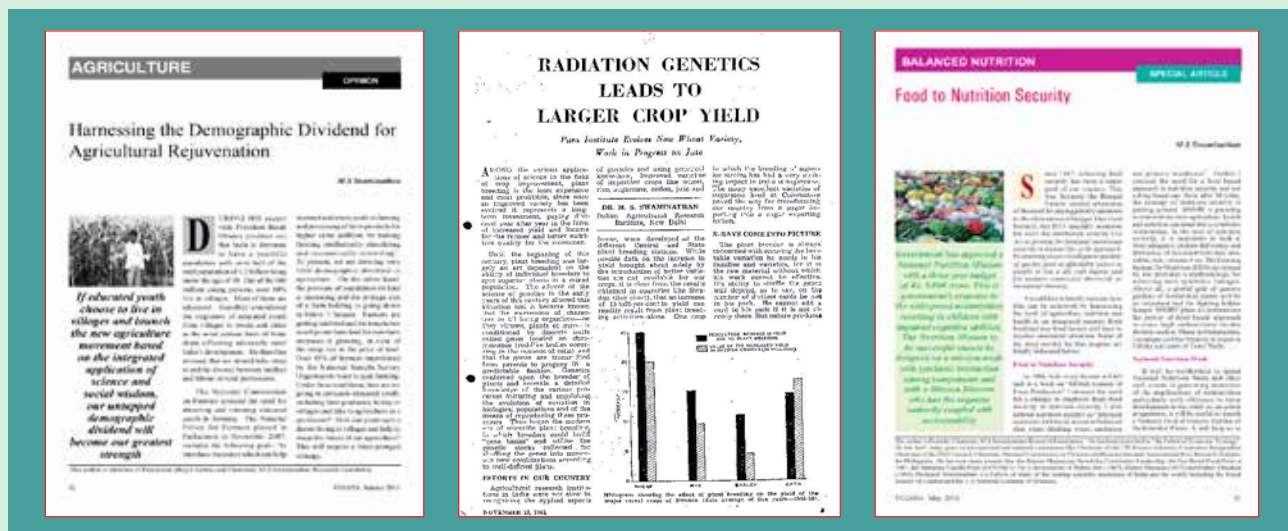
India's journey from conventional to renewable sources of electricity generation marks a monumental step towards a sustainable energy future. The Government's unwavering commitment to ambitious renewable energy targets, coupled with innovative policies and incentives, has set the stage for a greener energy landscape. The surging popularity of solar energy, the consistent growth of wind power, and the exploration of other renewable sources signify India's determination to strike a balance between economic advancement and ecological well-being.

As India navigates the complexities of grid integration, energy storage, and infrastructure development, collaboration between the public and private sectors will be crucial. International partnerships, technological advancements, and skilled workforce development will play pivotal roles in shaping the trajectory of the energy transition.

India's transition to renewable energy sources is not just an energy transformation but a commitment to securing a cleaner, more sustainable, and prosperous future for its citizens. By embracing renewable sources of electricity generation, India stands poised to lead by example, contributing to the global fight against climate change and inspiring nations around the world to follow suit. □

# Remembering Prof MS Swaminathan

## The Father of the Indian Green Revolution



**Y**ojana has been fortunate to have Prof MS Swaminathan as our regular author since 1960s. A great agricultural scientist whose unmatched contribution to global food security indeed requires no mention, his farmer-centered scientific innovation and sustained advocacy for policy and planning towards self-reliance in agriculture made the association with this journal even more enriching to our readers. As a tribute to the man whose influence, knowledge, and expertise will guide the scientific communities in the generations to come, below are the excerpts of Prof Swaminathan's interview published in January 2020. In this conversation with Sanjay Ghosh, Yojana Chennai, Prof Swaminathan fondly recollected his association with Yojana in the early 1960s. **"In those years (1960s), there were very few issues of Yojana where my article would not have appeared",** Prof Swaminathan had mentioned with pride.

"We are essentially an agriculture country. That's what we have to recognise. Modern industry is labour saving. Agriculture is labour absorbing. Job-led growth is needed, and agriculture provides the solution. For food system we require more land. Ideally, a country should produce more and

more food in less and less land. Try to maximise the productivity pathway than area expansion. We can easily manage it by growing crops at higher productivity level. Also, we must include along with productivity, the quality of the grain, whether it is Basmati or any other variety, which you can export more. If you can export more you can grow more rice. We have largest rice cultivating area in the world—over 40 million hectares. So, there is lot of scope to grow more rice, more wheat.

When the rice and wheat crop rotation began in Punjab, stubble burning started. I have been a witness to this from the beginning. Generally, rice varieties will grow long. But then the rice has to be harvested. The rice has to be harvested by September/October so that wheat can be planted at the right time. Otherwise, wheat yield will go down. Therefore, I have suggested we should have varieties

of rice that can be harvested earlier. The longer the duration the better the yield, but they don't go by the one-crop yield. Take two crops together: the rice and wheat rotation.

Somehow, there is a completely new crop rotation now in Punjab. Wherever this rice and wheat



Prof MS Swaminathan  
(1925-2023)

rotation is in place, we need a Rice Bio Park. Rice Bio Park means every part of the rice—the plant, the straw, the hull, the husk, the leaves—all of them should be utilised. They all have uses. My point is that unless there is an economic value to them, farmers will not adopt them. In South India, they don't burn straw.

In my house, we used to have four or five cows, so straw was very important and was used to feed the cows. My mother would not waste even one straw, as there was an economic value to it. People look after it. Farmers resort to stubble burning when they don't have any economic value. Stubbles have so much value. I wrote to the state governments to buy all the stubbles from neighbouring states, taking them as feed to the cattle.

But in this kind of change in cropping system, we have to provide technology to the farmers in the fields to convert rice straw into useful end products. For example, in ancient times in Tamil Nadu, there were five major farming systems, namely, *Kurinj*, *Mullai*, *Marutham*, *Neithal*, *Paalai*. In the hill zone, forest zone, wet zone, the coastal zone, and the desert zone, each required different methods to be adopted for farming. But I think that knowledge is now forthcoming. You see, normally they blame the farmers. They are producers. We have become number one producer of rice in the world. Thailand used to be number one. What is important here is the rice stubble. It is a good source of calories for animals and also has good vitamins. How can farmers make use of this untapped source for additional income? It becomes a raw material for making paper, board, it becomes a re-manure method for improving soil fertility. Economic value will make the farmer stop stubble burning. So, there are economic uses of stubble, but there is a need for proper dissemination of information on the economic value of stubble.

Our people are aware of the climate problem. In fact, we were among the first to have the IMD, or Indian Meteorological Department, for climate measurement because we are largely an agricultural country. Due to the whole photosynthesis, agriculture is the main source of renewable energy. We know in South India, for example, they worship the Sun and the green plant during the Pongal time. The idea of the Sun being worshipped is the fact that the green plants are absorbing the sunlight and converting it into energy. These are all advanced stages of knowledge. When I ask people, what is the meaning

of the Pongal? Why do they choose sugarcane as a variety? People don't know that. Sugarcane is the most efficient absorber of solar energy.

Behavioural change comes at three levels. One is from home, where the role of the mother is very important. Secondly, in schools and colleges. Thirdly, the society, your life and your attitude towards public life. There is an effort. The Prime Minister particularly tries his best to spread the news about the dangers of climate change. But I would say, we do not yet have it in our schools, colleges, and homes. In our own homes, we still switch on air conditioners even when they are not needed. Now you should know every unit of energy we depend on is non-renewable energy, then we are in difficulty. So how do you promote renewable energy instead of non-renewable energy? In other words, there is a need for energy management at household levels, at institutional levels, and in cities and towns. So, it requires a number of steps to create more public awareness at schools and colleges.

I strongly believe every Panchayat should have a climate management society. We should try to educate the Panchayat members about the need to combat climate change. We are unique in one sense. We are a democratic society, at three levels—at the grassroot level, Panchayat institutions, and at the State-level legislative committees, and so on. In terms of life and public education at the National level, we also have a large number of academies, scientific institutions, and a number of universities. At the political level, starting from Gram Sabha to the Parliament. And that is why I would say public education should become everybody's business. Not only a few, but we should all feel that the climate does not distinguish between the rich and the poor. All are equal before the climate. And only if you are rich, you try to manage the climate in your own room by using energy. I think the time has come for us in our country, to come together to tackle climate change.

We started MS Swaminathan Research Foundation (MSSRF) climate research in the year 1989. Over thirty years, we have taken a number of steps on this front. In the beginning, there was very great reluctance. But things are changing. I think we are in the mode of transitioning from a high-carbon society to a low-carbon society. We should try to make use of this transition as much as possible, for the good of the country." □