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HOW INDIA CAN BECOME A GLOBAL GIANT

TOP EXPERTS GIVE A ROADMAP FOR 10 KEY SECTORS

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TOP EXPERTS GIVE A ROADMAP FOR 10 KEY SECTORS

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At the India Today Conclave in 2003, former US President Bill Clinton had said: "I have no doubt India will be a giant. But what kind of giant? You must become a global giant and the right kind of giant." What does being a global giant mean, and what is the right kind? India is already a giant in many respects: the largest population, the fifth largest economy, the seventh largest in physical size and, above all, the world's largest democracy. President Clinton quite likely implied, 'Not a global giant like China'. A country that is autocratic at home and practises 'wolf warrior' diplomacy abroad. How can India become the right kind of global giant? The answer depends on what we mean by the question. A global voice other nations pay heed to? Superpower status? An economic powerhouse?

The current government's ambition is to create a Viksit (developed) Bharat by 2047. We seem to be on the right path to achieve this goal. Even through nasty global recessions, we have held on to a healthy growth rate of 6.5 per cent since the mid-1990s. Plain continuity will convey us upward: being the third largest economy is within sight. But we do not want mere inertia of motion. We must attain freedom from want, indignity and an inferior life for our hundreds of millions. That will begin the real expansion of our capabilities and enable us to become the right kind of global giant.

This special I-day issue pares down the gargantuan challenges confronting India into 10 keystone areas. Articles by our editorial team, organised thematically, lead to an ensemble of guest essays from the best minds in their respective sub-fields, 29 in all, who approach different facets of the challenge. Think of it as a collectively authored script for India—an expert roadmap for the future.

Having such a blueprint is essential. We are perhaps the only country which straddles many centuries together simultaneously, from subsistence farming to some of the most advanced rocketry in the world. For the most part, these layers don't hang well together; they stay like oil and water. A genuine growth model for India will seek to integrate these components and make them work in tandem. History can often be an instruction manual for how not to do things. Our early decades invite the criticism that they kept the animal spirits of entrepreneurship under a tight leash and relied too heavily on inefficient government entities to deliver. We are a nation of entrepreneurs whose power needs to be released by the government. As we reset our priorities for 2047, one thing is certain: no part can be kept waiting till the others are sorted out. The vanguards of growth cannot be forgotten till the rear is fortified, and vice versa. Everything must move together, synergistically.

The first imperative is to have an action plan to ensure we have sustained GDP growth—8 per cent annually must be the floor, not the ceiling, for the next two decades. Secondly, that self-propelled engine will move on world-class infrastructure. Our freight of ambitions needs physical conduits—a latticework of high-speed rail and expressways, ports and airports, linking us with each other and with world markets. Also, neural networks of the digital kind to convey ideas and information. Such a foundation will enable the third step: India leapfrogging to Industry 4.0, where manufacturing and services function at the cutting edge of global standards to create jobs and prosperity. What must our industrial landscape

look like? Author-industrialist Naushad Forbes says we should "seek a future that looks like Germany, with thousands of specialised world leaders, rather than China or South Korea, with a few dozen giant state-sponsored champions". In this beehive model, India will maximise the world's new 'Plus One' strategy and harness AI to its fullest. That leads to the fourth prerequisite: critical and emerging technologies incubated in our own R&D labs to not just keep pace with the world but to lead it.

Technology is a universal enabler and recurs as a leitmotif in all sections. For instance, space technologies are typically dual-use and mark a zone where India is poised to be a world leader. In the terrestrial realm, where a secure country needs to be an impenetrable fortress, we find satellite imagery segueing with cutting-edge drones, submarines and missile systems for both geospatial surveillance and interception. But weather predictions link space to another earthly preoccupation: agriculture. In this keystone project, we must wean farmers away from their addiction to traditional grain crops, and scale up their per capita productivity by a decisive shift to horticulture, dairy and fisheries.

The key is to reform our agriculture to align with market forces, without which we cannot become a developed nation. No growth model will make sense if we neglect our staggering inequalities. Amit Kapoor, Chair at the Institute for Competitiveness, writes, "India's GDP per capita, a true indicator of a nation's prosperity, is \$2,730 (approx. Rs 2.3 lakh)...much lower compared to our developing bloc peers, including Brazil (\$11,350), China (\$13,150), Vietnam (\$4,620) and South Africa (\$5,970)." India's G20 Sherpa Amitabh Kant pegs the target per capita income at \$18,000+ (upwards of Rs 15 lakh) in three decades.

They are not alone in seeking a refocusing of India's agenda away from the poverty line to what I call the dignity line. It has two key building blocks: education and healthcare. Some 35 per cent of our children are stunted—thus prone to cognitive deficits and poor learning outcomes. Alongside, we have an ironic double whammy. While malnutrition stalks the base of the pyramid, an epidemic of lifestyle diseases—diabetes, cancer, cardiac problems—imparts a disturbing twist to India's health challenge. That too, when the scourges of the past, like tuberculosis, persist. So, the lack of quality universal literacy marks us against the 'miracle' economies of Southeast Asia, and a sickly nation cannot be a world leader even if we can look forward to being the pharmacy of the world. The ninth imperative extends that to the health of our habitat: our air, water and soil. The greening of our economy is a precondition to all else, with decarbonisation built into growth.

Milestones make you think along two cardinal directions. Looking back at the journey so far is a natural impulse. But that's only a complementary act to thinking ahead, even if it seems like plotting one's steps in the dark. The following pages hold deep, incisive takes from a galaxy of domain specialists on how we must chart our path—from a NASA scientist to former defence chiefs, industry leaders and technology savants and top names in nuclear, aviation, higher education, et al. In the end, the tenth segment is what will get the world to doff its hat to us: India's soft power. Yoga, culture, wisdom traditions. That unique amalgam of the past and the contemporary must give us the freedom of ambition. Happy Independence!

(Aroon Purie)

Illustration by NILANJAN DAS

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- Door No: 610, 610A, 612, 5th Floor, Block A, Imperial Chaitanya Building, Anna Salai, Teynampet, Chennai, Tamilnadu-600018.
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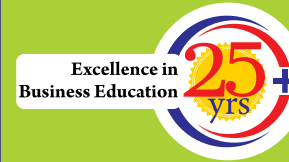
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COVER STORY

HOW INDIA CAN BECOME A GLOBAL GIANT

Where must India be in 2047? As we approach our century of Independence, our sights must be set on a lofty peak: this time, to be a fully developed nation that has attained freedom from want and indignity. An economic and technological leader seen with respect by the outside world, as a truly global giant and a force for good. From where we are now, that calls for a compass, including a moral one. In the following pages, thought leaders present a blueprint in 10 key sectors:

1. Economy
2. Infrastructure
3. Industry
4. Education
5. Technology
6. Defence
7. Health
8. Agriculture
9. Energy
10. Soft Power

Illustration by NILANJAN DAS



SKY IS NOT THE LIMIT



IN NEED OF A BOOSTER DOSE

INDIA CANNOT TAKE ITS EYE OFF THE BALL IF IT HAS TO MAINTAIN A GROWTH RATE OF 7-8 PER CENT IN THE NEXT TWO DECADES TO BREAK INTO THE LEAGUE OF HIGH-GROWTH ECONOMIES

By **M.G. Arun**

In several of his speeches at election rallies prior to the general election, Prime Minister Narendra Modi underlined a key economic prospect—that India would become the third largest economy in the world quite early in his third term. Modi, who had won the election twice before for the Bharatiya Janata Party (BJP) on the promise of a stronger economy and business-friendly policies, felt that glossy figures regarding India's economy still resonated with the masses. The election, however, proved that Indian voters were concerned about a host of pressing issues, not least of which were the dearth of jobs and high prices. The BJP subsequently won fewer Lok Sabha seats than it expected to, making it dependent on allies to form the government. But that hasn't stopped Modi from showcasing India's strides on the economic front, or even saying the country is on track to becoming a developed nation. "When India celebrates 100 years of Independence (in 2047), we will do so as a developed country," he told industry honchos in Delhi in a post-budget interaction on July 30. "Today, India is the fifth largest economy in the world. The day isn't far when India will become the third largest in the world."

To be sure, the Indian economy has performed well, and much better than most of its peers on the global stage.

It made a quick recovery from the pandemic, and has grown at 8.2 per cent in FY24. Inflation, though near the upper end of the Reserve Bank of India's (RBI) tolerance band of 6 per cent, has not been as runaway as in some other emerging nations. Not only does India's economy look more insular and robust compared to its neighbours, its resilience and growth stand in stark contrast to even the developed world, especially the US and Japan, who have been gripped by concerns of an impending recession. The numbers speak for themselves. India's foreign exchange reserves, which serve as a financial cushion and help bolster the rupee, stood at an all-time high of \$674.9 billion as of August 9. Multinational firms have opened scores of global capability centres in India, underlining its strength in services exports, which grew at a faster clip than exports of goods. Indian airlines carried 154 million passengers in FY24, 12 million more than in pre-Covid FY20, while passenger vehicle sales were a record 4.2 million.

AIMING FOR HIGHER GROWTH

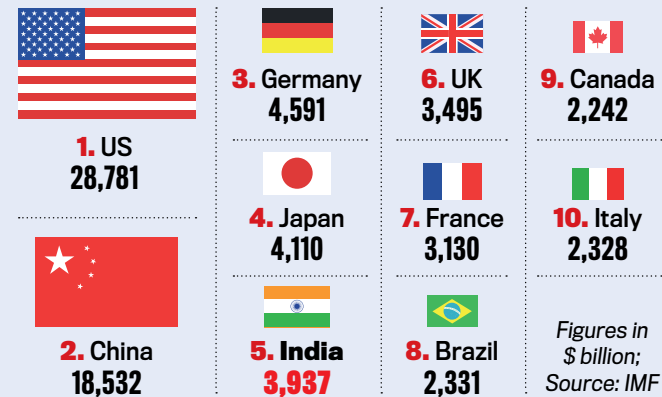
But given the size of the economy and the magnitude of India's problems, even the 8 per cent growth may not be adequate. Economists say the growth numbers seem inflated as they come after a steep fall into the negative territory during the pandemic, and would be around 7 per cent this

HOW INDIA CAN PLAY CATCH-UP

It must bolster consumption and private investment to stimulate industry and exports

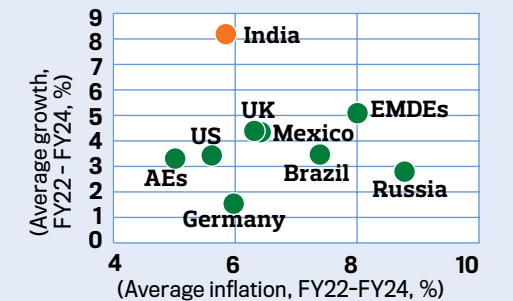
LEAGUE OF GIANTS

Currently 5th, India aspires to 3rd place among the world's 10 largest economies in absolute GDP (Jul. 18)



SO FAR, SO GOOD

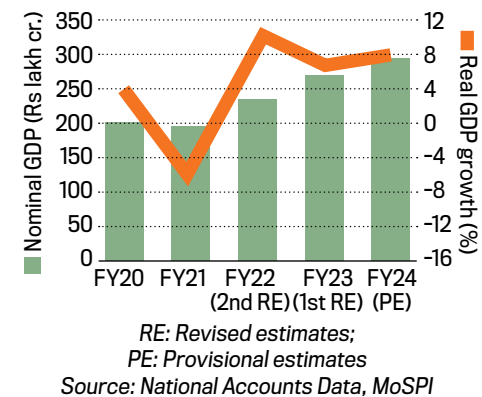
India's growing faster than advanced nations, while keeping inflation low



AEs: Advanced economies; EMDEs: Emerging market and developing economies
Source: IMF WEO database (April 2024), MoSPI

SMART RECOVERY

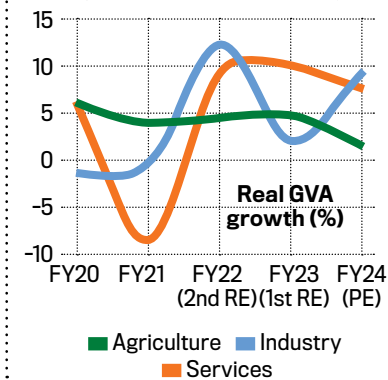
After the shock of Covid, India's yearly GDP needs to maintain the upward trajectory



RE: Revised estimates;
PE: Provisional estimates
Source: National Accounts Data, MoSPI

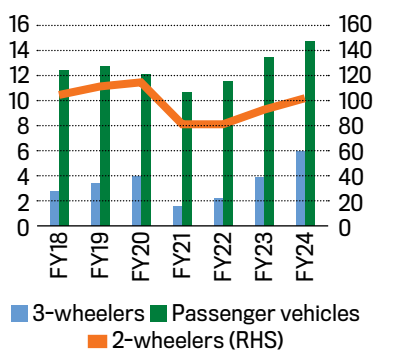
THE CHALLENGE

Industry shows some promise but agriculture growth remains a worry



THE RURAL VROOM

Vehicle sales in India's villages have had the sharpest recovery since the pandemic

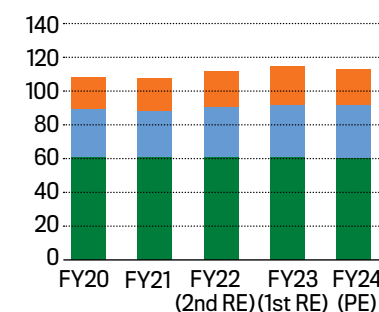


BIG PUSH FOR DEMAND

Steady so far, pvt consumption must grow faster to encourage investment

Private final consumption expenditure (demand) | Gross fixed capital formation (pvt investment) | Exports

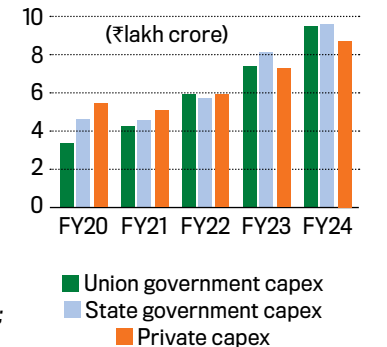
Per cent share in GDP



PRIVATE PROMISE

Private capex needs to step up to the plate so that it matches govt capex

Source: Handbook of Statistics on the Indian Economy, RBI; Axis Bank Research



year and the next. After all, the pandemic had taken a toll on the economy. The years 2019-2024 saw India's economy add only Rs 34 lakh crore compared to 2014-2019, when the country added Rs 42 lakh crore to the GDP. Some, like former finance secretary Subhash Chandra Garg, see the country growing at not more than 6 per cent. Crisil, a ratings firm, expects India to grow at 6.7 per cent till the turn of the decade but does not want to put out an estimate beyond that due to uncertainties in the geopolitical scene. "Even 6.7 per cent growth sustained will take us to a \$7 trillion economy (from the \$3.9 trillion at present) by the end of the decade," says Dharmakirti Joshi, its chief economist. That should buttress India's position in the GDP rankings, push it to No. 3 behind the US and China, and ahead of Germany and Japan, assuming that those economies grow slower than ours.

While 7-8 per cent growth may take us to the big league in terms of the size of the economy, it may not contribute significantly to prosperity, which is measured by per capita income. With a per capita income of around \$2,700 (Rs 2.3 lakh) compared to over \$13,800 (Rs 11.6 lakh) for high-income economies, India counts among the lower middle income countries. At the current growth rate, India will need 75 years to reach a quarter of America's per capita income, according to a recent World Bank report. "If India wants to replicate what the East Asian countries or China did, then it will have to grow much faster," says Joshi.

The question, then, is whether India can sustain the current growth and even grow at a higher rate to improve its prosperity and give enough jobs to the millions of youth that enter the workforce every year. "Even at 8 per cent, we would not recoup the losses we made earlier," says Madan Sabnavis, chief economist with Bank of Baroda. "With a normal monsoon, India's growth will be over 7 per cent this year. Sustaining it and getting it to 8.5 or 9 per cent is a challenge for the economy." India will need to focus sharply on a few areas in order to grow at a faster pace.

MAKING GROWTH SUSTAINABLE

The country will have to work on several quarters simultaneously to make its growth consistent.

➤ **Boost consumption:** One area of definite concern has been consumption. Demand for goods and services has not been growing as fast as India's GDP. Private final consumption expenditure, an official terminology to denote individual demand, grew only 3 per cent in FY24, even as the GDP

grew 8.2 per cent. Spending less on products and services is symptomatic of inadequate income and job insecurity or even joblessness. "It is not only mass products that are affected by the slackness in demand, even premium products have been affected," says Sabnavis. In the March quarter, fast-moving consumer goods company Hindustan Unilever saw its profits drop 6 per cent as consumers bought fewer goods, while rival ITC's profits were flat.

➤ **Attract private investment:** A lag in consumption has a debilitating impact on private investment. Fresh private investment plans by the private sector fell 15.3 per cent in 2023-24, says data from Projects Today. Lagging private investment, despite big tax relief offered to corporates, has been a concern for the government. But private investors won't put money in loss-making projects. The Centre has been pumping investment into infrastructure in the hope that private investment would take off at some point, but its pace has been rather slow. "Capital is a major driver of growth," says Joshi. "There is scope to increase India's investment to GDP ratio and push up growth too." New investments also improve the prospects for millions of India's young job-seekers.

➤ **Tame inflation:** High prices of goods have been another deterrent. With lower disposable income on the one hand and high inflation on the other, the consumer tends to put off buying decisions. Higher prices of vegetables, cereals and fruits took India's food inflation to a six-month high of 9.4 per cent in June. The Centre stepped in to curb high food prices through

more imports of certain food products and a ban on exporting items like basmati rice, but all these have had limited success, given the vagaries of India's weather. Moreover, core inflation (which excludes fuel and food) is close to 5 per cent because of higher cost of inputs.

➤ **Focus on green energy, digital technology and environment:** Is India still harping on developing traditional industries that add little value on a global scale? Garg tends to believe so. "We can no longer grow by making more and more textile mills or steel or cement. That will meet some domestic demand, but that won't give us the growth to move ahead of others," he says. According to him, the three sectors that India needs to focus on are green energy, digital technology and sustainability. The world over, big investments are taking place in the alternative energy space. According to the World Energy Investment 2024 report by the International Energy Agency, out of the total \$3 trillion investment that countries will make

TAKEAWAYS

➤ **Jobs and incomes must grow if India wants to push up consumption**

➤ **India should look beyond textiles and cement and focus on green energy, digital tech, sustainability**

➤ **Land and labour reform can no longer be ignored if we are to run the growth marathon**



ALAMY

AT THE CURRENT GROWTH RATE, INDIA WILL NEED 75 YEARS TO REACH A QUARTER OF AMERICA'S PER CAPITA INCOME, ACCORDING TO A RECENT WORLD BANK REPORT. IT NEEDS TO GROW MUCH FASTER

in energy, \$2 trillion would be for clean energy technologies and infrastructure. India has announced big plans and said that the country will see an investment of Rs 30 lakh crore to meet its target of 500 GW of renewable energy by 2030. This needs steadfast implementation.

India has moved much ahead in its quest to build digital infrastructure, thanks to the high proliferation of mobile phones and the internet, but more needs to be done to ensure better pan-India connectivity so that the benefits of technology seep down to the most deserving. What India lacks, says Garg, is technology innovation. That leaves us with the need to import technology. "However, we have some policy cobwebs. For instance, we will not cooperate with China, or allow Chinese investment to come in." That sets us back by several years, he adds. China, on the other hand, is capturing the world market with its products. For instance, in electric vehicles, it has an 85 per cent market share, while India's share is just 2 per cent. Sports, travel, entertainment

and personal services (captured in the acronym 'STEPS') will be the drivers of growth in the future.

➤ **Improve efficiency:** Joshi believes that what drives growth in the long run are capital (investments), the quality and quantity of labour, and efficiency. Efficiency will play a more important role than in the past because when physical infrastructure is created, connectivity improves and turn-around time gets reduced. He advocates the need to push through reforms in land and labour to improve ease of doing business. "Reforms are very critical from the point of view of running a growth marathon. How quickly the country moves will determine how fast it will grow," he says.

The next two decades to 100 years of India's independence will be a race that will test the country's resilience in some very challenging times. If it can leverage its human capital to take a growth leap, India will ensure better opportunity and more prosperity to the millions of its citizens. ■



FROM POVERTY LINE TO DIGNITY LINE

For India to grow at full potential, we must transform the bottom 50 per cent of our income distribution from passive beneficiaries of welfare schemes to active contributors to personal and national growth

The best way for India to become a global power is to sustain annual economic growth rates of above 8 per cent. High growth is also the best way to eliminate poverty, improve citizens' lives and generate the tax revenues needed to fund an effective social safety system that can support those who fall into poverty and help them bounce back. How can we achieve these high and sustained growth rates?

A simple summary of the Indian economy is that the top 10 per cent of the income distribution create firms or secure well-paid jobs. The next 30-40 per cent find employment of varying quality serving the demand created by the top 10 per cent, and the bottom 50-60 per cent (mainly in rural areas) are largely excluded from India's growth story. They rely on welfare programmes to achieve basic living standards and to obtain at least some of the gains of economic growth.

This model has served us reasonably well, delivering growth rates of around 6 per cent. At 140 million people, even 10 per cent of India's population is large enough to drive innovation, start-ups, and skilled-service exports including staffing large global capability centres. However, to achieve sustained growth rates of 8-10 per cent, we will need to fire on all cylinders. This will require us to transform the bottom 50 per cent of India's income distribution from passive "beneficiaries" of welfare schemes to active contributors to their personal and national growth. This is also what people want. One consistent message from the 2024 election is that voters appreciate reliable delivery of free foodgrains, but would rather have a good job.

The job conundrum: How do we create more good jobs? Since most Indians cannot afford to be unemployed, our unemployment rate is actually



low. Rather, the real challenge is to improve job *quality* defined by metrics such as wage levels, job stability, and benefits such as paid sick leave. However, offering higher wages and benefits is costly. Employers can only sustainably pay higher wages and benefits if employee productivity exceeds their costs. So, the main way to improve job quality is to increase productivity.

The primary obstacle to higher productivity is our weaknesses in human development—spanning education, nutrition, and skills. Data indicate that over half of rural Indian children complete primary school without being able to read a simple paragraph. Further, 35 per cent of children under 5 are stunted, adversely affecting their lifelong education and health. The early years of life are crucial for cognitive development: children who have not 'learnt to read' by age 10 are not equipped to

'read to learn', placing them at a permanent disadvantage in a skill-driven job market. Notably, every East Asian 'miracle' economy that had sustained growth rates over 8 per cent had education systems that delivered high-quality learning to almost all citizens.

If current trends persist, in 2047, 25 per cent of children will still be stunted, and 16 per cent of rural Indian children will still complete Class 5 unable to read at a Class 2 level. We can and must do better, aiming to deliver universal foundational literacy and numeracy and sharply reduce child stunting in the next decade. Doing so will both enhance the life prospects of millions of children, and also lay the foundation for faster economic growth.

Spending smartly: However, improving education and nutrition is not simply a matter of increasing budgets. Research consistently shows that the translation of 'government as usual' expenditure into outcomes is very poor. We spend a lot on items that have limited impact on outcomes, and do not spend enough on highly effective and cost-effective ideas. We need to spend smarter.

For instance, a recent large-scale study in Tamil Nadu found that adding a worker focused on early-childhood education in government-run anganwadis significantly improved learning outcomes and reduced stunting by 17 per cent by doubling instructional time, and enabling the existing worker to focus more on nutrition. The long-term benefits of the programme are estimated to be 12-20 times the cost, yielding a return on investment of 1,200-2,000 per cent! Thus, adding a worker in every anganwadi across India could directly create over a million jobs, increase female labour force participation, and lay the foundation for faster human development and economic growth in a cost-effective and affordable manner.

Beyond expanding evidence-based interventions, it is essential to shift policy discourse from the top-line of budget allocations to the bottom-line of outcomes. A key enabler of this shift is better outcome data. For instance, Telangana recently conducted a district-level KPI (key performance indicator) survey across 50,000 households, which will yield annual data on child nutrition and learning outcomes at the district level. Such annual data can transform governance and development, by focusing government efforts on improving outcomes rather than simply implementing schemes.

Finally, as the examples above show, much of the action in delivering essential public services is at the state level. Thus, accelerating human development and growth will require enhanced trust and coordination between central, state, and local governments with a lot more attention paid to improving the effectiveness of state and local governments. ■

The author is Tata Chancellor's Professor of Economics, University of California, San Diego (UCSD), and author of Accelerating India's Development: A State-Led Roadmap for Effective Governance

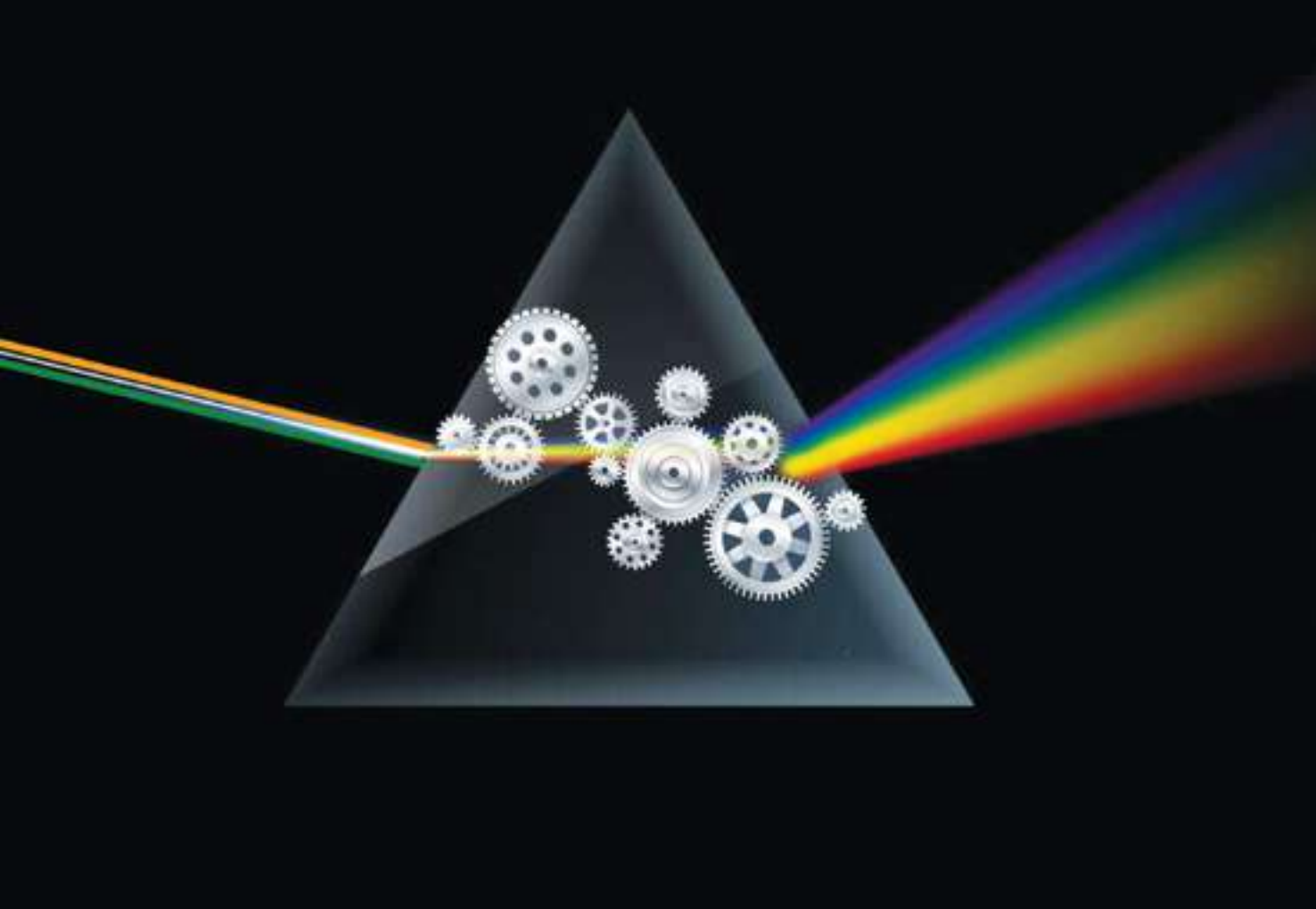
THE GIANT STEPS

➤ **If current trends persist, 25 per cent of children in India will still be stunted in 2047, and 16 per cent of rural children will still complete Class 5 unable to read at a Class 2 level**

➤ **Every East Asian 'miracle' economy that had sustained growth rates over 8 per cent had education systems that delivered high-quality learning to almost all citizens**

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HONING THE COMPETITIVE SPIRIT

India's vision for a Viksit Bharat in 2047 will require a genuine acknowledgement of our competitive advantages and disadvantages

India is the fifth largest economy in the world, with a GDP of \$3.2 trillion in 2023, and we have been growing at an average rate of 7.6 per cent in the past decade. However, on closer examination, certain key indicators reveal a startling picture. India's GDP per capita, a true indicator of a nation's prosperity, is at \$2,730 (Rs 2.3 lakh). It is much lower compared to our developing bloc peers, including Brazil (\$11,350), China (\$13,150), Vietnam (\$4,620) and South Africa (\$5,970). To look at a broader indicator of India's holistic well-being, our social progress ranks at 110 out of 169 countries in 2022; approximately five points below the global average score. Moreover, India's GDP per capita places the country at the 111th rank out of 164 countries assessed on social progress.

For India to attain its vision of becoming a \$30 trillion economy, we will need to grow incrementally at a rate of 9.7 per cent. Achieving this would elevate India's GDP per capita to \$18,000 (Rs 15 lakh) by 2047, at par with developed economies. India would need to harness the potential of its heterogeneous landscape at the state and district levels. This is important as many Indian states are larger than some of the countries in the world, not just in terms of population but also GDP. Bihar and Uttar Pradesh currently constitute 25 per cent of India's population, yet have the lowest per capita income in the country at \$420 (Rs 40,000) and \$698 (Rs 58,500) respectively. Therefore addressing regional disparities at the subnational level becomes important. We have extensive ground to cover, and there's too little time!

A captive market: India's sizeable population presents significant opportunities as an expansive market for demand. According to the World Economic Forum, India is expected to witness a 4x spike in consumer expenditure, with the middle class driving 75 per cent of it in 2030. Hopes for a catalytic transformation are pinned on this class, given their purchasing power and capacity for discretionary spending. However, the rising income inequality dampens the opportunity to tap this market potential adequately. Analysing the sample estimates from PLFS (Periodic Labour Force Survey) 2022-23, we find that a monthly salary of Rs 30,000 is amongst the top 10 per cent of total incomes earned, bringing to stark relief existing income disparities. The share of the top 1 per cent makes up 6-7 per cent of total incomes earned, while the top 10 per cent accounts for a little over one-third of all incomes earned. Addressing income disparities is a prerequisite for realising India's market potential.

It's essential for an economy to transition from being factor-driven to being innovation-driven for sustained growth in prosperity. This takes action on two fronts: enhancing innovation and human resource capacity. In 2023, India was ranked 40 out of 132 countries in the Global Innovation Index, making remarkable strides in its start-up ecosystem and in scaling digital infrastructure. It scored the highest in Market Sophistication (20th) and Knowledge and Technology Outputs (22nd). Yet in 2020-21, 43.7 per cent of the gross R&D expenditure came from the central government, whereas the private sector industry contributed only about 36.4 per cent. Additionally, to enhance human resource capacity, we need a pool of highly skilled workers who can

easily adapt to the rapidly changing job market. In India, only 11 per cent of the workers are highly skilled, 67 per cent are semi-skilled, whereas 22 per cent are low-skilled. Beyond enhancing the skills of the existing workforce, a focus on labour mobilisation is also crucial. Though India's productivity growth has been robust, it is not matched by positive trends in labour mobilisation. According to the World Bank, India's employment to population ratio is only 53 compared to China's 63. Though India's female LFPR (labour force participation rate) has increased from 23.3 per cent to 37 per cent, the male LFPR still accounts for more than 75 per cent of the labour force. This limits the scope for utilising the full potential of our youthful demographic profile.

The missing middle: The sectoral transformation from agriculture to industry has been relatively slow. According to KLEMS (capital, labour, energy, materials, services) data, the share of manufacturing in the Gross Value Added (GVA) has fallen from 17.4 per cent in 2011-12 to 15.8 per cent in 2021-22, the highest fall among the three sectors of the economy. While productivity growth has been driven by large firms, job creation has not. A majority of employees are trapped in small, low-productivity and low-growth firms, while there is a substantial "missing middle". Even among the MSMEs, the backbone of the Indian economy, there is a 90 per cent fall in the micro category, further accentuating the 'missing middle' conundrum. When firms scale up, they are better able to participate in GVCs (global value chains). GVC integration in manufacturing is another opportunity we haven't fully capitalised on. Through the 1990s and 2000s, India's GVC participation rose steadily and peaked at 47.6 per cent just before the financial crisis in 2008, but given the size of our economy, India trails significantly behind other

key Asian economies like China, Malaysia and South Korea.

India's prosperous growth calls for concerted efforts on multiple fronts. However, the common thread guiding these interventions should focus on social progress, shared prosperity and sustainable and resilient growth in the face of external shocks. Economic growth should go hand-in-hand with social progress. The journey so far has been a mix of losses and gains. India's vision for 'Viksit Bharat' in 2047 calls for a genuine acknowledgement of our competitive advantages and disadvantages. ■

THE GIANT STEPS

- **Address regional disparities at the subnational level to harness the potential of its heterogeneous landscape**
- **Tackle the wide income inequalities to take advantage of its market potential**
- **Move from being a factor-driven economy to being an innovation-driven one. This means enhancing innovation and human resource capacity. Also, focus on labour mobilisation**
- **Concentrate on GVC (Global Value Chain) integration in manufacturing by encouraging smaller firms to scale up**

The author is Chair, Institute for Competitiveness



THE ESSENTIAL GROWTH SUTRAS

To move to a higher economic plane, India must fortify its human capital and harness emerging technologies to deliver all-round growth. Champion states need to be key drivers in that growth



About 10 years ago, India was seen as one of the 'Fragile Five' economies, with shaky macroeconomic fundamentals.

Confidence in the economy was plummeting, and inflation spiralling. Even though the economy had been liberalised in the '90s, a web of regulations still existed, making India one of the toughest places to do business in. Over the past decade, we have seen all this change. India is now a 'bright spot' in the global economy, recording 8.2 per cent growth in FY24.

However, to become an economic superpower, we must sustain this growth rate for the coming decades. Only then will our per capita incomes increase from \$2,100 to \$18,000+ in three decades' time, making us a high-income country. If we do not sustain these rates, we risk being stuck in a middle-income trap. Investment rates will need to rise, along with domestic savings. Being a function of income, domestic income and savings will only rise with broad-based employment growth.

Improving social outcomes to harness demographic dividend: India, with its demographic dividend and burgeoning workforce with an average age

Illustration by NILANJAN DAS

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THE GIANT STEPS

➤ We need to sustain a high growth rate, else we'll be stuck in a middle income trap. Investment rates need to rise, so too domestic savings

➤ To realise our demographic dividend, India needs to improve learning outcomes, employability of tech grads and target the missing middle in health insurance to improve health outcomes

➤ R&D spend, especially from the private sector, needs to go up, to capitalise on emerging tech. Alongside, regulation too needs to adopt a pro-innovation approach

➤ India must emerge as a mineral processing hub

➤ We must reform the governance of our cities and upgrade our city infrastructure

of 29 years, is home to one of the world's youngest workforce. However, we must improve our social outcomes to realise this dividend. Improving learning outcomes, especially at foundational levels, is critical. Improving employability of graduates from technical and vocational education is another crucial step. Aligning curricula with industry needs, along with well-designed internship and apprenticeship programmes, can help improve employability. Building on Ayushman Bharat, we must now target the 'missing middle' in India's health insurance. Primary healthcare must be strengthened to improve health outcomes. All these efforts, in turn, will hinge critically on nutrition.

Leveraging technology: Going ahead, digital technologies that are sector-agnostic will drive competitiveness. Emerging technologies such as AI, IoT, space, 6G and quantum computing, among others, have opened avenues to disrupt sectors such as agriculture, energy transition, defence, manufacturing, healthcare, life sciences and the digital economy. India is also making strides in geospatial technology, defence and drone technology. With digital public infrastructure providing a strong backbone, we are well poised to capitalise on these technologies. However, R&D expenditure must increase, both from the public and private sector. Globally, most R&D is done by the private sector, with the government playing an enabling role. To spur R&D by the private sector, the government announced a Rs 1 lakh crore R&D fund, aiming to catalyse private investment and drive India's leadership in emerging tech. As technology gives rise to new business models, regulators need to move in sync. A pro-innovation approach to regulation will drive innovation and growth.

Energy transition: India cannot grow as countries have in the past by exploiting the environment. Our growth model

must have sustainability at its core. The energy transition presents an opportunity for India to become energy-independent and, eventually, an exporter. Reaching our 2030 and net zero targets require a tripling of our current effort in renewable capacity addition. Besides expanding solar energy, we must also target harnessing our wind energy potential. Along with renewables, green hydrogen and energy storage, such as batteries and pumped storage, will be crucial in industrial and transport decarbonisation. As in petrochemicals, India must aim at emerging as a mineral processing hub. The G20 Mineral Security Partnership (MSP) can be leveraged to establish raw material supply. Energy efficiency can contribute significantly to energy transition. Currently, India's energy efficiency norms are lower than those in other countries. As in the case of BS VI fuel, we must target leapfrogging in these norms.

Urbanisation: Growth is driven by cities and urban agglomerations. India's urban population is expected to rise to the tune of hundreds of millions in the coming decades. Through metros, we are building for the future. However, we need to upgrade our city infrastructure, in terms of waste management, traffic management, climate adaptation and resilience and affordable housing, among other things. Our cities are among the most polluted in the world, and without their clean-up, we will not become an economic superpower. We must reform the governance of our cities.

Export orientation: Central government investments in infrastructure have risen to 3.4 per cent of GDP from a decade back and are lowering the cost of logistics. The focus must now shift to other cost disadvantages, the cost of doing business being a major one. States must now take the lead in implementing the reform agenda. Land, labour and power remain important areas for reforms. We must aim to make India one of the easiest places to do business in.

Champion states as drivers of growth: India will only grow when states grow. States such as Uttar Pradesh, Bihar, Rajasthan, Odisha, Jharkhand and Chhattisgarh, among others, will have to grow much faster than the national average at rates of 10 per cent-plus to enable catch-up growth and broad-based per capita income growth. Much of the labour force in these states is employed in agriculture, and they must diversify their economies beyond it. Enabling reforms, sustainable urbanisation and a focus on improving socio-economic outcomes can yield multiplier impacts. ■

The author is India's G20 Sherpa, and former CEO of NITI Aayog. Views are personal



PAVING THE GROWTH PATH
The eight-lane, 29.2 km long Dharmveer Swarajya Rakshak Chhatrapati Sambhaji Maharaj Coastal Road in Mumbai

HIGHWAY TO THE FUTURE

FAST LANE TO PROGRESS

India's ambitious infrastructure drive is transforming roads, railways and aviation while integrating climate resilience, positioning the nation for accelerated growth and global competitiveness by 2047

By **Avishek G. Dastidar**

It's not our wealth that built our roads. It's our roads that built our wealth." A version of this famous saying by former US president John F. Kennedy is displayed on a wall in the visitors' waiting room at the office of Nitin Gadkari, Union minister of road transport and highways. Gadkari aims to build a highway network that rivals the best in the world, significantly reducing travel time for goods and passengers, and enhancing the competitiveness of Indian industry. The highways sector receives over Rs 2 lakh crore annually for the construction, upgrade and maintenance of more than 10,000 km each year. Over the past decade, the network has expanded by around 60 per cent to approximately 1.4 lakh km. India is already reaping the benefits of improved infrastructure, with transit time for freight trucks decreasing by about 20 per cent over the past 10 years due to better highways, expressways and electronic tolling, according to government data. The greenfield Delhi-Mumbai Expressway is set to reduce

THE MODI GOVERNMENT, IN ITS ENDEAVOUR TO CREATE THE WORLD-CLASS INFRASTRUCTURE INDIA NEEDS TO BECOME A GLOBAL POWER, IS WILLING TO INVEST HEAVILY ACROSS ALL KEY SECTORS

the 48-hour journey between the two cities to just 12 hours. A similar transformation is occurring in the Railways. Over the past decade, the government has significantly increased funding for the country's oldest transport utility. The annual outlay has risen from around Rs 53,000 crore in 2014-15 to Rs 2.5 lakh crore this year, with a 15 per cent year-on-year increase over the decade. The vision for 2047 is that it should take no more than 6-8 hours for trains or even trucks to travel between cities like Delhi and Kolkata, or Chennai and Mumbai.

MASSIVE INFRA PUSH

The Narendra Modi government, in its endeavour to create the world-class infrastructure India needs to become a global power, is willing to invest heavily across all key sectors. It charted a capital expenditure course of Rs 111 lakh crore for the five-year period between 2020 and 2025, aimed at propelling India towards its goal of becoming a \$5 trillion (Rs 415 lakh crore) economy. This initiative, known as the National Infrastructure Pipeline, encompasses a range of social and economic infrastructure projects. A quarter of the amount has been pumped into creating a robust power infrastructure, covering

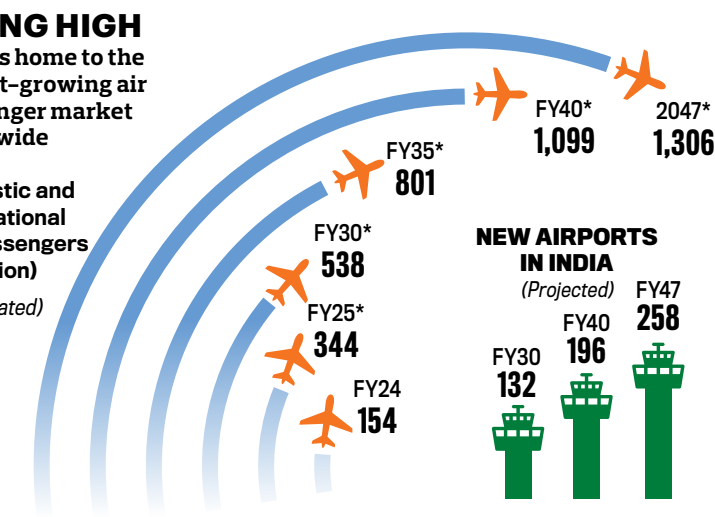
THE LONG JOURNEY AHEAD

The government is committed to investing heavily in building world-class infrastructure

FLYING HIGH

India is home to the fastest-growing air passenger market worldwide

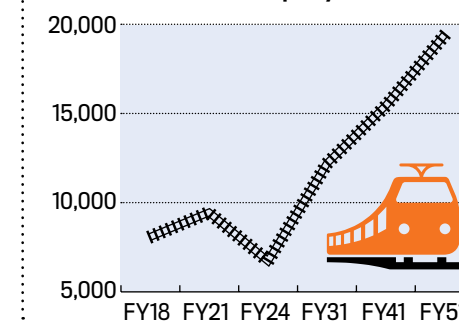
Domestic and international air passengers (in million) (*Estimated)



ON THE FAST TRACK

Indian Railways is expected to see a surge in its patrons

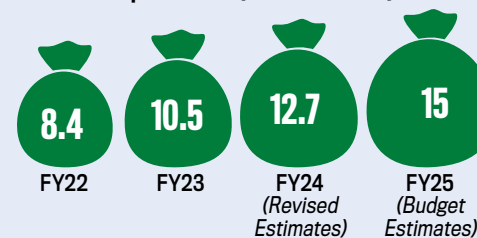
Annual passenger projections (million per year)



MEGA INFRA SPEND

The Centre's capital investment outlay has been steadily rising

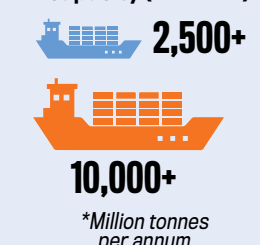
Effective capital expenditure (in ₹ lakh crore)



MARITIME MATTERS

There has been a focus on the blue economy, a major contributor to exports

Overall port handling capacity (MMTPA*)



No. of carbon-neutral ports



No. of transshipment hubs



URBANISATION

India's urban population is estimated to increase from current levels of ~36% in FY22 to ~51% by 2047 (Aug. 15) of the expected total population of around 1.65 billion



ROADS

Length of national highways increased from 97,991 km in FY15 to 144,634 km in FY24. 50,000 km of access-controlled highways with an investment of Rs 20 lakh crore by 2047



Source: Government data

generation, transmission and distribution. The initiative also aims to increase the share of non-fossil fuels in India's energy mix from the current 42 per cent to around 64 per cent by 2030. Additionally, a third of the funds have gone into building roads and railways, enhancing connectivity between cities and towns for faster, smoother and safer transportation of men and material. In all, around 9,800 projects are receiving this concentrated spending, including in areas like urban infrastructure, airports, ports and telecommunications and so on. Already the impact is being witnessed. For example, the

overall turnaround time for ships at Indian ports has decreased by nearly 50 per cent, from 94 hours to an average of about 48 hours. Also, the ports have doubled their cargo handling capacity to over 1,600 million tonnes.

All these efforts are building an ecosystem that aims to reduce India's logistics costs from the current 13-14 per cent of GDP to a single-digit figure, in line with benchmarks set by developed countries. According to CRISIL Research, infrastructure investments will nearly double by 2030, with spending projected at Rs 142.9 lakh crore between FY24 and FY30.

While the lion's share of this investment will come from the government, the private sector is increasingly focusing on the energy and transportation sectors, it says. "Enhanced connectivity through modern roadways, railways, ports and airports will reduce transportation costs and improve trade efficiency," says Nilachal Mishra, partner and head of government & public services, KPMG India. Such a huge outlay helps. "Investments in reliable utilities and digital infrastructure will boost industrial productivity and foster innovation. According to studies by the Reserve Bank of India and the National Institute of Public Finance and Policy, every rupee spent on infrastructure yields a 2.5 to 3.5 rupee gain in GDP," he explains.

THRUST ON SMART MOBILITY

In one of the first major decisions in its third term, the Modi government has allocated an additional Rs 50,000 crore to build eight new high-speed national highway corridors totalling 934 km. These include a swanky, access-controlled, four-lane Ayodhya Ring Road, a six-lane corridor between Agra and Gwalior and a four-lane Kanpur Ring Road, among others. The centrepiece of this initiative is an 80-km, eight-lane elevated corridor between Nashik Phata and Khed near Pune, designed to drastically ease logistics movement. Over the next two decades, the number of greenfield access-controlled high-speed expressways, like the Delhi-Mumbai Expressway, is expected to grow significantly, with over 50,000 km planned. Officials estimate a total capital expenditure of more than Rs 20 lakh crore for these projects.

The rail network expansion plan for the next decade includes multi-tracking the busiest routes and converting the Golden Quadrilateral routes connecting all major metro cities into semi-high-speed corridors. Today, the Railways operates over 50 pairs of its latest offering, the Vande Bharat Express trains, India's version of world-class train travel. The country has not only electrified nearly its entire rail network but has also expanded it by approximately 25,000 km through new lines and multi-tracking—almost double the achievement of the previous decade. Additionally, the Metro network is now operational in 20 cities across the country. "We see world-class mass mobility as a key catalyst in taking India's dynamic economy forward," says Olivier Loison, head of multinational rolling-stock major Alstom India. Loison thinks India's investment in future-ready mobility solutions also boosts local

economies and communities by bridging the gap between people and opportunities, businesses and talent. "It's clear that robust infrastructure development is the cornerstone of resilient, inclusive and sustainable cities."

In the mobility space, aviation is experiencing an unprecedented boom post-Covid. More Indians are flying now than ever before, and the number is set to grow further as more airports and airlines are in expansion mode. This surge has propelled India to become the third-largest domestic aviation market in the world, with 15.5 million seats, surpassing Brazil, which now ranks fourth. The US and China remain the top two. Indian airlines such as Air India, IndiGo and others have placed orders for over 1,000 new aircraft, the largest order value for any country. IndiGo, which aims to double its fleet size by 2030, anticipates that India's aviation sector will contribute even more to the GDP in the coming years. The future of India's aviation infrastructure will include multiple aviation hubs, says Girish Nair, partner and aviation sector lead, KPMG India. "India has a tremendous potential to create multiple hubs by strengthening our aviation ecosystem to funnel the huge domestic and foreign traffic, thereby emerging as a global aviation hub," he explains.

BUILDING RESILIENCE

Along with scaling up its infrastructure, India has also actively joined the global conversation on keeping future assets resilient to climate disasters. "Disasters are increasing in frequency and severity," says Amit Prothi, director general, Centre for Disaster Resilient Infrastructure (CDRI), an India-headquartered inter-governmental body. The CDRI estimates India's potential loss of infrastructure due to disasters related to natural hazards and climate change at \$31.6 billion (Rs 2.6 lakh crore) a year, with floods alone accounting for \$28 billion (Rs 2.3 lakh crore). "By embedding resilience into infrastructure development... [India] will avoid infrastructure being destroyed or damaged, reduce service disruption, ensure more reliable public services, social development and accelerate economic growth."

In the elite club of developed nations and major economies, undertaking large-scale projects to construct and expand public assets is par for the course. China began this process long ago and is now reaping the benefits. Over the past 20 years, it has focused on massive infrastructure spending to establish it-

IN ITS THIRD TERM, THE MODI GOVT HAS ALLOCATED AN ADDITIONAL Rs 50,000 CRORE TO BUILD EIGHT NEW HIGH-SPEED NATIONAL HIGHWAY CORRIDORS

self as a global economic superpower. This includes building the world's largest high-speed rail network, spanning over 40,000 km, the Three Gorges hydroelectric dam—the largest on the planet—and the advanced Beijing Daxing International Airport. China's urbanisation efforts and extensive 5G network development have also been pivotal, boosting economic growth and enhancing global connectivity.

INDIA'S GLOBAL POSITION

Where does India stand? According to the World Bank, the country spent around 29 per cent of its GDP on gross fixed capital formation in 2022, while China spent nearly 42 per cent. In contrast, developed countries like the UK, France, Germany, Japan and the US kept this figure within the range of 18-26 per cent of their GDP. In other words, it will take a while before India can scale down its infrastructure spending. This reflects the government's unwavering faith in the critical role of infrastructure in shaping India's growth story, given its multiplier effect on the economy, says Anup Sahay, head of corporate strategy and special initiatives at Larsen & Toubro. "A comprehensive and committed approach to infrastructure will enhance connectivity, create jobs, ensure holistic development, and improve living standards," he adds. The likes of Gadkari may be right—India's journey to joining the ranks of developed nations by 2047 may well be paved by the roads, trains and bridges being built today. ■

TAKEAWAYS

➤ Major infrastructure spending in power, roads and railways under the National Infrastructure Pipeline

➤ New highways and expressways like the Delhi-Mumbai Expressway to cut travel time and boost competitiveness

➤ Vande Bharat trains, network electrification, and metro expansion across 20 cities

➤ India is the third-largest domestic aviation market with over 1,000 new aircraft ordered



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PRATAPGAD

MAJESTIC STRONGHOLDS

EXPLORING THE HISTORIC FORTS OF MAHARASHTRA

Chhatrapati Shivaji Maharaj, a seminal figure in Indian history, is celebrated for his resistance against the Mughals and his vision of Hindavi Swaraj, or self-governance. Central to his military strategy was an extensive network of forts across Maharashtra, strategically placed on hilltops, coastlines, and inland areas. These forts were crucial for defense, administration, and training, facilitating prolonged sieges, guerrilla warfare, and efficient communication throughout the Maratha Empire. Notable examples include Raigad, the empire's capital, and Sinhagad, famed for its heroic battles. These forts were not merely military installations; they were vibrant centers of socio-political and cultural activity, hosting palaces, temples, and reservoirs.

Maharashtra boasts around 350 forts, each offering a unique glimpse into Maratha history. Here are some must-visit forts for history enthusiasts and architecture lovers:

HARISHCHANDRAGAD FORT

Ahmednagar

Harishchandragad, a renowned trekking destination, dates back to the 6th century under the Kalchuri dynasty. Located in Ahmednagar, the fort features ancient caves with idols of Lord Vishnu and holds cultural significance with references in the Matsyapurana and Agnipurana. Key attractions include Saptatirtha, Kedarshwar, and Taramati Peak.

How to go: Road: Mumbai – 201.8 km | Rail: Igatpuri – 41 km

Nearby Sights: Malshej Ghat, Naneghat Hills, Amruteshwar Temple, Pimpalgaon Joga Dam, Girijatmaka Temple, Ratangad Fort, Bhairavgad, Kalu Water Fall.

RATANGAD FORT

Ahmednagar

Ratangad Fort, situated in the Western Ghats, is famous

for its natural rock peak with a cavity known as “Nedhe” or “eye of the needle.” The fort, with its four gates—Ganesh, Hanuman, Trimbak, and Konkan—offers stunning views and reflects ancient architecture. Captured by Chhatrapati Shivaji Maharaj from the Mughals, it remains one of his favorites.

How to go: Road: Mumbai – 177.2 km | Rail: Igatpuri – 56 km

Nearby Sights: Kalsubai Peak, Radha Falls, Bhandardara, Wilson Dam and Arthur Lake, Amruteshwar.

GAWILGAD FORT

Amravati

Near Chikhaldara hill station, Gawilgad Fort features Persian inscriptions and two water tanks, Devtalav and Khantalav. The fort's legends, including its association with the Gavli community, add to its mystique.

How to go: Road: Mumbai – 694.1 km | Rail: Badnera – 95 km

Nearby Sights: Bhimkund Point, Chikhaldara Hill Station, Panchbol Point, Shakkar Lake, Sunset Point, Shri Ambadevi Temple, Amravati, Mozari Point, Rukmani



RAIGAD

“The forts which dot the landscape of Maharashtra, from the Sahyadri mountain ranges to the coastal region play in preserving the rich historical legacy and attracting tourists from across the globe. They are not merely remnants of the past; they are vibrant symbols of Maharashtra's cultural heritage and a testament to the valor and architectural prowess of bygone eras. Our government is committed to revitalizing and promoting these historical structures, to provide an immersive experience for visitors eager to explore the narratives etched into their walls. We plan to enhance accessibility to these forts through improved infrastructure and organized tours that would enlighten tourists about the historical significance and support local economies. By investing in preservation efforts and marketing campaigns, we will do justice to our state as a premier destination for heritage tourism, fostering a deeper appreciation for the unique stories of resistance, triumph, and craftsmanship that these forts embody. Exploration of our forts is nothing short of a journey through time, a way to relive the pride of our illustrious past”.

GIRISH MAHAJAN, Minister Of Tourism, Government Of Maharashtra



VIJAYDURG

Balaji Temple Balajipuram.

DAULATABAD FORT

Aurangabad

Also known as Devagiri, Daulatabad Fort was built in the 11th century by Yadava King Bhillama V. Serving various rulers, its unique rock-cut tunnel, moat, and numerous bastions showcase advanced military engineering. Highlights include the 210-foot Chand Minar and the Mendha canon.

How to go: Road: Mumbai – 312 km | Rail: Mangoan – 15 km

Nearby Sights: Ellora Caves, Grishneshwar Temple, Hiranya View Point, Chandminar View Point, Ajanta Caves, Bibi Ka Maqbara, Himayat Bagh, Bani Begam Bagh, Darwazas.

PANHALA FORT

Kolhapur

Panhala Fort, 20 km northwest of Kolhapur, is a historic hill fort perched 3,200 feet above sea level. Captured by Chhatrapati Shivaji Maharaj in 1673, it served as a key Maratha capital. Originally built in the 12th century by the Shilahara dynasty, it later fell under Yadava and Sultanate control before becoming a Maratha stronghold. Known for its stone walls and watchtowers, Panhala Fort remains a significant historical and tourist site.

How to go: Road: Mumbai – 375.9 km | Rail: Kolhapur – 30 km

Nearby Sights: Shri Mahalakshmi Temple, New Palace, Rankala Lake, Shree Jyotiba Temple, Kaneri Museum, Shri Binkhambi Ganesh Mandir, Shree Kopeswar Mandir, Dajipur Wildlife Sanctuary, Rautwadi Waterfall, Radhanagari Wildlife Sanctuary & Dam.

KANDHAR FORT

Nanded

Built by Rashtrakuta king Krishna III in the 10th century, Kandhar Fort features a stepwell from the Yadava period and Persian inscriptions by Muhammad Bin Tughlaq. Legends connect it to the Mahabharata, and nearby archaeological relics enrich its historical narrative.

How to go: Road: Mumbai – 621.5 km | Rail: Nanded – 40 km

Nearby Sights: Manar Dam Warwant, Golegaon Fort, Shiradhon Fort, Limbati Dam Reservoir, Fort Nanded, Gurudwara Fountain, Mata Gujari ji Visava Garden, Shri Guru Gobind Singh Ji Museum, Kaleshwar Mandir Vishnupuri, Nadigram Fort, Asna River Dam.

SHIVNERI FORT

Pune

Shivneri Fort, the birthplace of Chhatrapati Shivaji Maharaj, is located in Junnar, 90 kilometers from Pune. This triangular hill

fort features a ‘chain entrance’ and showcases architecture and water systems from the 1st century AD. It also houses the temple where Shivaji was named and the infamous Kadelot Point for criminal punishments.

How to go: Road: Mumbai – 202 km | Rail: Pune – 94 km

Nearby Sights: Lenyadri Caves, Shree Vighnagar Ganpati Temple, Vigneshwara Temple, Manikdoh Dam, Junnar Caves, Pimpalgaon Joga Dam, Girijatmaka Temple.

SINHAGAD FORT

Pune

Once known as Kondhana, Sinhagad Fort is renowned for its steep slopes and the 1670 Battle of Sinhagad led by Tanaji Malusare. The fort's relics, including monoliths of Tanaji and the Kaundinyeshwar Temple carvings, highlight its rich past.

How to go: Road: Mumbai – 180.2 km | Rail: Pune – 36.8 km

Nearby Sights: Dagdusheth Halwai Ganpati Temple, Pataleshvara Cave Temple, Shaniwar Wada, Empress Botanical Garden, Aga Khan Palace, Raja Dinkar Kelkar Museum.

TORNA FORT

Pune

Torna Fort, or Prachandagad, is located 65 km from Pune. Built in 1643 by Chhatrapati Shivaji Maharaj, it played a key role in establishing Maratha sovereignty. Today, it is a popular trekking destination with scenic views, historic ruins, and opportunities for photography and bird watching. Visitors can explore the remains of old structures, walls, and temples reflecting its historical significance.

How to go: Road: Mumbai – 198.5 km | Rail: Pune – 54.6 km

Nearby Sights: Madhe Ghat Waterfall, Zunjar Machi, Kadve Khind, Shivsahyadri Hills, Nanemachi Waterfall, Rajgad Fort.

RAIGAD FORT

Raigad

Raigad Fort, 25 km from Mahad, was renovated by Chhatrapati Shivaji Maharaj and became the Maratha Empire's capital in 1674 AD. Perched 1,350 meters above sea level, it is renowned for its strategic importance and impressive architecture. The fort symbolizes Maratha resistance against Mughal rule and is a cultural heritage site with burial places for notable Maratha leaders. Today, Raigad Fort attracts tourists for its rich legacy and architectural marvels.

How to go: Road: Mumbai – 162 km | Rail: Mangoan – 27.7 km

Nearby Sights: Diveagar Beach, Jagadishwar Temple, Raj Bhavan, Madhe Ghat Waterfalls, Raigad Museum, Varadvinayak Temple, Ballaleshwar Temple.



SHIVNERI

PRATAPGAD FORT

Satara

Constructed in 1656 on Chhatrapati Shivaji Maharaj's orders, Pratapgad Fort was crucial during his conflict with the Adilshahi sultanate. The 1659 battle leading to Afzal Khan's death marked the Maratha Empire's rise. A 17-foot bronze statue of Chhatrapati Shivaji Maharaj, unveiled by Jawaharlal Nehru in 1957, stands here. The fort features temples and trekking routes, making it a historical and cultural treasure.

How to go: Road: Mumbai – 217.7 km | Rail: Pune – 142 km

Nearby Sights: Shivkalin Khedegaon, Krishnabai Temple, Elephant's Head Point, Mahabaleshwar Hill Station, Hunting Point, Mahabaleshwar Temple, Shri Panchganga Mandir, Lingmala Waterfalls.

SINDHUDURG FORT

Sindhudurg

Sindhudurg Fort, built on Khurte island by Chhatrapati Shivaji Maharaj, began construction in 1664. This Maratha Navy headquarters features an irregular shape and deep indentations, reflecting Chhatrapati Shivaji Maharaj's tactical acumen. It provides insight into Maratha foresight and craftsmanship.

How to go: Road: Mumbai – 488.7 km | Rail: Kudal – 34 km

Nearby Sights: Malvan Marine Sanctuary, Jay Ganesh Mandir, Tarkarli Beach, Raghunath Market, Rock Garden, Tsunami Island Vengurla, Devbagh Beach.

VIJAYDURG FORT

Sindhudurg

Vijaydurg, built between 1193 and 1205, was later captured by Chhatrapati Shivaji Maharaj in 1653. Known as the ‘fort of victory,’ it served as a strategic maritime fortress and is often called the ‘Eastern Gibraltar’ for its impregnable nature. Its construction with laterite stones and its coastal location make it a significant site for maritime history enthusiasts.

How to go: Road: Mumbai – 435.6 km | Rail: Rajapur Road – 63 km

Nearby Sights: Vijaydurg Beach, Kotharwadi Beach, Juve Bet, Kalamba Beach, Devgad Fort, Devgad Beach, Taramumbari Beach, Padavane Beach.

Maharashtra's forts are not just historical sites but cultural landmarks that host festivals and events, reflecting the region's rich history, architectural brilliance, and the legacy of its rulers. Welcome to Maharashtra—where you can walk through the glorious pages of Indian history!



SINDHUDURG

BUILDING A LOGISTICS SPEEDWAY

By investing in infrastructure, enhancing data visibility, and optimising Digital Public Infrastructure and asset use, India can build a world-class logistics sector

As India charts its course towards becoming a global economic powerhouse, the logistics sector emerges as a critical driver of this ambition. The efficient movement of goods and services across the country and beyond its borders is not merely a facilitator of economic growth but a fundamental catalyst. To truly unlock its potential and achieve the status of a 'Viksit Bharat' by 2047, India will have to continue its logistics revolution by focusing on four key areas—continuing the focus on infrastructure development, outsourcing and development of 3PL and 4PL service providers (3PL or third-party logistics manages tasks like transportation, warehousing and order fulfillment for businesses, and 4PL or fourth-party logistics oversees the entire supply chain, coordinating multiple 3PLs and providing strategic management), optimum utilisation of assets and usage of Digital Public Infrastructure (DPI).

Leveraging the infra backbone: The focus on infrastructure development is already setting in motion the logistics revolution. The government has demonstrated its strong commitment through the implementation of various initiatives like the Bharatmala Pariyojana, the Dedicated Freight Corridor project and the Sagarmala scheme. These projects aim to create a seamless, multimodal transportation network that will significantly reduce logistics costs and improve efficiency.

Recent budgets have consistently allocated substantial funds for capital expenditure, with a focus on infrastructure development. The 2024 budget alone allocated Rs 11.11 lakh crore. This investment has a multiplier effect on the economy, benefiting various sectors, including logistics and supply chain operations. In logistics, this will help in reducing the turnaround times in road and other sectors which will help in reducing lead times, especially, for perishable goods. In the shipping sector,



THE GIANT STEPS

- ▶ **Continue the focus on infrastructure development; the Bharatmala Pariyojana, dedicated freight corridors and the Sagarmala scheme will significantly reduce logistics costs and improve efficiency**
- ▶ **Execute outsourcing effectively and cost-efficiently. It will reduce the cost of doing business and**
- ▶ **the carbon footprint**
- ▶ **Embrace cutting-edge technologies which can optimise logistics operations and maintain competitiveness**
- ▶ **In shipping, the turnaround time has reduced to 2 to 3 days but to be world-class, we need to be better than the USA at 1 day and Japan at 0.32 day**

for example, the turnaround time has significantly reduced to 2 to 3 days but in order to be world-class, we need to be better than the USA at 1 day and Japan at 0.32 day.

Outsourcing and asset utilisation: For India to emerge as a global power and achieve a best-in-class supply chain, outsourcing must be executed as effectively and cost-efficiently as possible. And 3PL/4PL players aggregate demand, benefit from economies of scale and provide tech-based digital solutions which are flexible and scalable. The truck capacity utilisation in India in percentage terms is still way lower than the advanced economies and transportation is the starting point of outsourcing itself!

Outsourcing is also key to increased utilisation of assets. The infrastructure developed for logistics needs to be utilised at capacity, which can be achieved effectively by aggregating activities through 3PL/4PL players. This increased throughput reduces the cost of doing business while also reducing the carbon footprint.



By R. Dinesh

Digital Public Infrastructure—driving efficiency and innovation: A crucial pillar of India's logistics revolution is the adoption of advanced technology and the effective use of DPI. Embracing cutting-edge technologies is essential for optimising logistics operations and maintaining competitiveness. Leveraging digital know-how can turn the logistics sector into a key differentiator, solidifying India's position as a global power.

Utilising the rich data available through the ULIP (Unified Logistics Interface Platform) portals, e-way bills and GST data points and using new-age technologies will lead to significantly better outcomes through route optimisation, network planning and inventory management to further facilitate efficiencies across the entire supply chain.

Supporting small-scale operators: The fragmented nature of India's logistics sector, largely run by small-scale operators, can be advantageous. These operators focus on cash generation for their livelihood and growth, and at the same time help reduce delivery costs. Large companies should harness these small-scale players, integrating them into the global supply chain via technology and data linkages. This integration will help small operators access logistics infrastructure and DPI for effective service delivery in small towns and rural areas.

Enabling the transformation: India's journey from a \$30 billion economy in 1947 to the current \$3.9 trillion (Rs 327 lakh crore), ranking as the 5th largest economy in the world, is a testament to its potential. To become a global power and supply chain hub, the country has to leverage its unique strength of the digital backbone, the rich data collected and being further augmented daily to leapfrog over even developed countries and make logistics a differentiator for India in the years ahead.

To fully capitalise on this opportunity, continued investment in infrastructure, increased data visibility, and optimised use of DPI and assets are essential. By focusing on these key areas, India can create a world-class logistics sector that not only reduces costs and improves efficiency but also provides a competitive edge in the global marketplace. As we progress towards Viksit Bharat 2047, a robust and efficient logistics sector will undoubtedly be one of the key drivers propelling us towards our goal of becoming a global economic powerhouse.

India has all the essential elements ready to be a global powerhouse and it is a rare confluence of opportunities coming together to provide the tailwinds for the next few years and the logistics sector and companies should utilise this for their benefit and the nation's advantage. ■

The author is Chairman, TVS Supply Chain Solutions

BECOMING THE HUB OF GLOBAL AVIATION

India's aviation sector is poised for unprecedented growth, with both domestic and international passenger numbers and aircraft fleet expected to double by FY30. This rapid expansion presents a unique opportunity to establish the country as an international aviation hub

Indian aviation is set to experience once-in-a-lifetime growth which will see both the domestic and international markets more than doubling in size over the next 5-6 years. Domestic airport passenger numbers could increase from 307 million in FY24 to 600-700 million by FY30, while international traffic could go up from just under 70 million passengers to 140-160 million over the same period.

Meanwhile, the fleet of Indian carriers is similarly expected to double in size to reach around 1,400 aircraft by FY30. In short, the growth that Indian aviation has experienced in the 90+ years since J.R.D. Tata piloted Air India's first flight, will be replicated in just the next 5-6 years. This is growth at a rate that has rarely been seen in global aviation, with China being perhaps the only comparable precedent. It has the potential to transform Indian aviation—and the Indian economy—provided that we prepare for it appropriately. Attention needs to be given to ensuring that there is an enabling ecosystem in terms of institutional infrastructure, policy, regulation and skills. Developing a pipeline of trained resources across the aviation value chain will be a critical part of India's growth story.

The scope for global aviation hubs: One of the key opportunities that exists is the development of Indian airports as global hubs. A successful hub requires not only world-class airport infrastructure, but also airlines with the network, fleet, product and vision to compete for connecting traffic. Twenty years ago, India had neither. And then, as a result of the airport modernisation programme, the country's infrastructure improved beyond recognition. But the best airport in the world cannot be a successful hub without a home carrier that is intent on operating a hub.

In the past couple of years, the second piece of the puzzle is starting to come together. The privatisation of the national carrier has given birth to an Air India that seeks to become a leading global airline with an extensive international network supported by a modern widebody fleet for long- and ultra-long haul operations.

In parallel, IndiGo has been rapidly expanding its short- and medium-haul international network, as a result of which it has been attracting transfer traffic even by default. With the induction of more long-haul narrowbodies, supported now by an order for widebody equipment, IndiGo will increasingly be positioned to actively capture intercontinental traffic



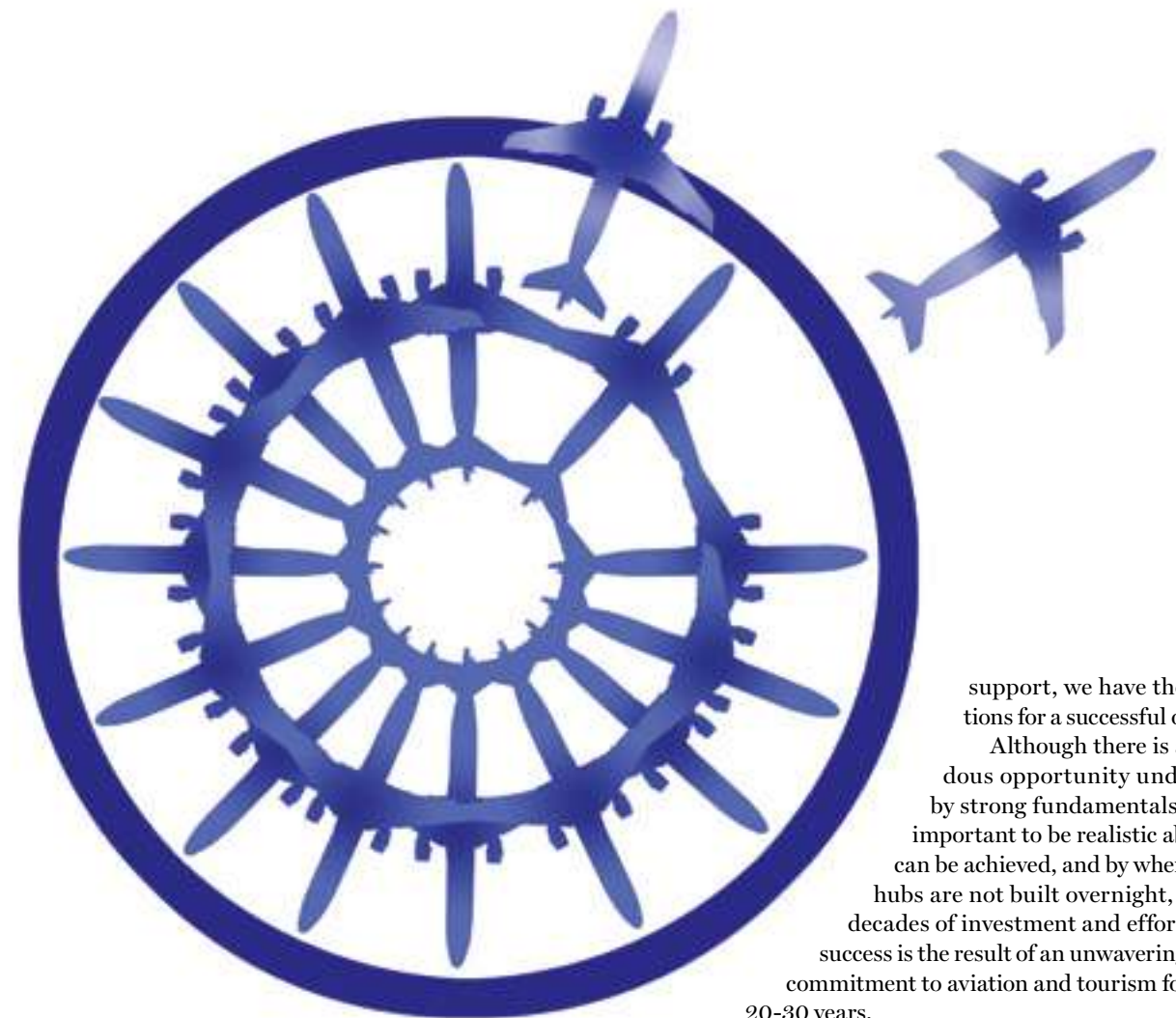
By Kapil Kaul

THE GIANT STEPS

➤ **The growth that Indian aviation has experienced in the 90+ years since J.R.D. Tata piloted Air India's first flight, will be replicated in just the next 5-6 years**

➤ **One of the key opportunities that exists is the development of Indian airports as global hubs. A successful hub requires not only world-class airport infrastructure, but also airlines with the network, fleet, product and vision to compete for connecting traffic**

➤ **India's location is as good, or in some cases better, than hubs in the Gulf or Asia, to be able to provide competitive routings between Europe, the Middle East and Africa on the one hand, and Asia Pacific on the other**



support, we have the foundations for a successful outcome.

Although there is a tremendous opportunity underpinned by strong fundamentals, it is also important to be realistic about what can be achieved, and by when. Airport hubs are not built overnight, they take decades of investment and effort. Dubai's success is the result of an unwavering national commitment to aviation and tourism for the past 20-30 years.

flows. CAPA Advisory expects that Indian carriers will operate an additional 150 widebodies by FY35, supplemented by A321XLRs on medium-haul routes.

Between Air India and IndiGo's complementary business models, they will be able to capture both premium and price-sensitive passengers, by leveraging India's favourable geography to connect passengers via Indian airports.

Geographical advantage: India's location is as good, or in some cases even better, than hubs in the Gulf or Asia, to be able to provide competitive routings between Europe, the Middle East and Africa on the one hand, and Asia Pacific on the other. There is a genuine opportunity for 2-3 Indian airports to emerge as leading global hubs, in cooperation with Air India and IndiGo, which are as attractive and competitive as the likes of Dubai, Abu Dhabi, Doha, Singapore or Hong Kong, for example.

The proposition of Indian hubs is further strengthened by the unique stopover experiences that India can offer tourists. Short stopovers can encourage passengers to return for longer visits that will drive the long-term growth of inbound tourism. The Government of India clearly recognises this opportunity and has stated its strategic intent to support the development of hubs. If it can provide the necessary enabling

Pivotal role of key stakeholders: India cannot take it for granted that its hubs will succeed. And it cannot be left to airlines and airports alone. Central and state governments need to focus on developing tourism infrastructure, ensuring that the cost base is competitive, offering simplified visa and facilitation processes, developing multi-modal infrastructure, effectively promoting the destination, enabling airlines to trans-ship cargo, investing in airspace efficiency, and making safety and security paramount etc.

Similarly, airports will need to invest in infrastructure and facilities that are attractive to transfer passengers with relatively longer dwell times. Such traffic has different requirements to the origin-destination passengers that Indian airports mostly handle today. This will require a well-thought-through hub development policy. And it may need to be supported by a dedicated fund to incentivise airports that are not in a position to invest in world-class hub and transfer capabilities because of the high revenue share arrangements to which they are committed.

India has a tremendous opportunity to establish itself as a global aviation hub over the next 5-7 years, provided that it pursues this in a structured manner with close coordination between all key stakeholders. ■

The author is CEO & Director, CAPA India, a specialist aviation, aerospace and travel advisory practice



SHAPING THE NEXT TOURISM POWERHOUSE

With rich cultural heritage and natural beauty, India can become a global tourism favourite. But sustainability should be at the heart of all such efforts

As India celebrates its 78th Independence Day, it's an opportune moment to reflect on the transformative potential of our tourism sector. Tourism is one of the largest employers in the services sector, and given its tertiary impact, the industry can be a game-changer for India. With its rich cultural heritage, stunning landscapes, and warm and hospitable people, India has all the makings of a global tourism powerhouse. The country has also significantly enhanced its stature as a global destination for business opportunities. This has helped the country claim an increasingly prominent place on the world travel and tourism map. Yet, India is currently only the 22nd most visited nation in the world. Our goal should be to climb into the top 10 within the next 20-25 years.

The domestic travel and tourism industry has evolved and witnessed multifold growth, fuelled by improvements in infrastructure, rising earnings of the Indian middle and upper middle classes, and an increasing desire to spend more on travel. While international tourism is touching pre-Covid levels, domestic leisure tourism has surpassed pre-pandemic numbers, reflecting the critical strength of our domestic tourism market. The industry has



Illustration by NILANJAN DAS



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seen growth across all segments and price points, with travel becoming a key part of every household's budget plan.

The coming decade is particularly exciting due to the growing interest of Indian travellers in exploring the vast expanses of our own country. Nurturing this momentum will be critical. Further, catching the eye of the discerning, high-spending international tourist with a rooted presence in key source markets is essential for our future growth. But many of India's premier destinations are grappling with the challenges of overtourism. Integrating the concept of carrying capacity into our strategic planning is essential for a sustainable and prosperous future for the industry.

Infrastructure boost: Time and convenience of travel and choices of accommodation, activities and experiences at the destinations determine the propensity to travel. We can draw inspiration from the success stories across India, where direct flights, new train routes and destination-level rejuvenation have made travel and tourism more accessible. The government's focus on building roads, developing fast train services like Vande Bharat and expanding air connectivity with schemes like UDAN has already begun to reduce travel times, making intra-India travel more appealing.

While the popular destinations are now facing capacity strains, it is important for us to develop at least 200 model destinations on a war footing. Again, it is important to facilitate last-mile connectivity, ensure the availability of quality and standard accommodation, and build activities, exploration opportunities and experiences to hold the tourists for 2-3 days. This will not only unlock the cultural tapestry of our nation but also invigorate local economies and support sustainable tourism. Popular hotspots suffering from overtourism will also get an opportunity to recover, which is vital for long-term sustainability.

Homestays have also become an integral part of the tourism landscape, catering to the evolving preferences of travellers. The burgeoning homestay industry offers travellers the ethos of 'Atithi Devo Bhava' while showcasing the most beautiful interior parts of the country. The Indian government has recognised the potential of homestays in promoting tourism and supporting local communities. However, we need more uniform and conducive policies tailored to enable the homestay ecosystem to flourish.

THE GIANT STEPS

- Develop 200 model destinations with improved connectivity and experiences
- Enhance infrastructure through better roads, trains and air connectivity
- Implement sustainable tourism practices to address overtourism
- Foster public-private collaboration for aligned promotion and policies

special kind of travel; it's an attitude. By remembering that the places we visit are someone's home and adjusting our practices to sustain these destinations for future travellers, we can help preserve our crumbling tourist spots for future generations. It is important that all tourism stakeholders must actively embrace and promote sustainability.

For instance, under the aegis of MakeMyTrip Foundation, our social development arm, we have been working towards building resilience in high tourist influx destinations. This includes implementing effective waste management solutions and promoting community-based tourism models. Furthermore, we have been working on environmental conservation with our afforestation initiatives, having planted and supported over 1.7 million saplings. By incorporating these practices, we aim to ensure that tourism remains a force for good, benefitting local communities and preserving the natural beauty of our destinations for future generations.

As we chart this path towards making India the next global tourism powerhouse, let's celebrate our heritage, harness our strengths and work together to create a future where India stands tall as a beacon of world-class tourism. Nature has bestowed us with an unparalleled bounty, and the onus is on us to ensure that we can sustainably leverage it to the fullest. If we get it all correct, I will not be surprised to see India among the most travelled countries worldwide in the next two decades. ■

The author is Founder & Chairman, MakeMyTrip

Public-private synergy: Globally, tourism is hugely private, driven with government support and nimble policies. In India's federal structure, while the Union ministry of tourism provides the overarching structure, states have their own policies to drive tourism at the ground level. It is crucial for the public and private sectors to collaborate and align on what to promote and how to promote it. To facilitate ease of doing business and incentivise private equity, there needs to be a greater focus on creating uniform frameworks.

Striving for sustainability: Travel offers numerous benefits, but leaves behind one major negative: a carbon footprint. We cannot become a successful tourism destination until we, as travellers, adapt and learn to travel responsibly. Sustainable travel isn't a

MAKE IN INDIA MOMENT

DRIVERS OF CHANGE
MG Motor's plant at Halol near Vadodara in Gujarat

INDIA TODAY | ADITYA BIRLA GROUP
A FORCE FOR GOOD

Photograph by
HARDIK CHHABRA

THE GROWTH FACTORIES

Modi's vision of a \$10 trillion economy has spurred policy shifts that aim to transform India into a global manufacturing powerhouse. But China's dominance poses a challenge

By **Anilesh S. Mahajan**

The first Economic Survey of Modi 3.0 dropped a bombshell when it made a case for getting Foreign Direct Investment (FDI) from China to help India improve its participation in global supply chains through exports. Even as Union commerce & industry minister Piyush Goyal quickly scotched speculations about easing Chinese capital inflows, the economic survey—tabled a day before the Union budget to provide an overview of the Indian economy's performance—has set off a debate.

China is India's largest trade partner, with export/import volumes exceeding \$118 billion (Rs 9.9 lakh crore, at the current exchange rate) in 2023-24. But India's trade deficit with China is also the highest at \$85 billion (Rs 7.14 lakh crore), not including Chinese products reaching its shores through free trade agreements (FTAs) with ASEAN countries. This gap was less than a billion dollars at the turn of the century when China joined the World Trade Organization (WTO). Since then, China has transformed itself into a bustling "factory of the world", capitalising on lower environmental compliances, surplus and cheaper labour, as well as economies of scale. It was producing enough to flood global markets with much cheaper products, especially when other emerging economies like India and Brazil continued to struggle with their own reforms to open up to foreign capital.

In fact, the share of manufacturing in India's GDP declined from 15.93 per cent in 2001 to 13.35 per cent

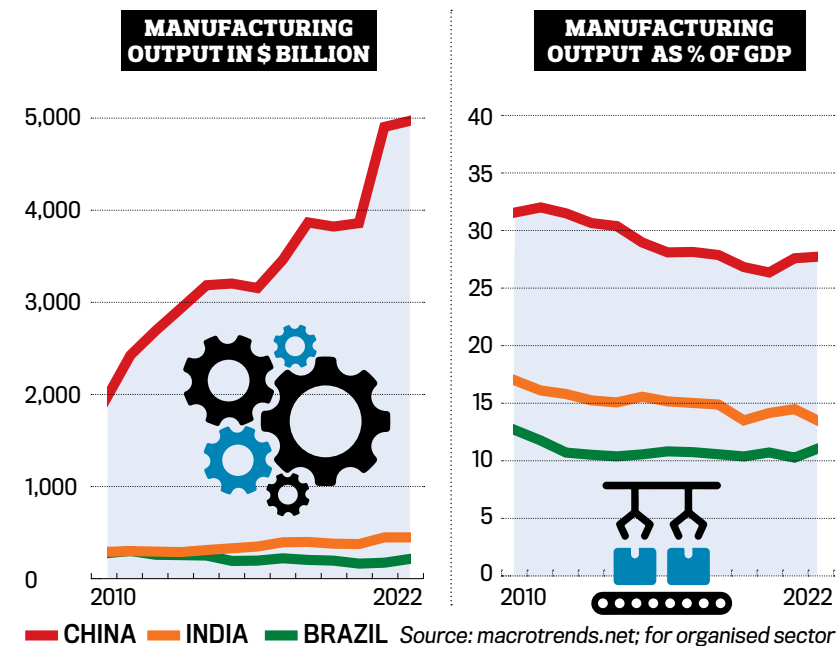
in 2022, despite the economy expanding by about a 6 per cent compound annual growth rate (CAGR). Many economists argue that India needs to continue blocking Chinese finished goods through both tariff and non-tariff barriers while incentivising domestic industry and opening up FDI to set up cutting-edge factories that manufacture intermediaries as well as final products. In 2020, when the pandemic forced the world to devise the 'China-plus-one' strategy to diversify investments into other emerging economies, India too saw an opportunity to boost its manufacturing. Around the same time, Chinese aggression in Galwan and Beijing's opportunistic takeovers of Indian companies led to New Delhi shuttering Chinese FDI by amending rules, which mandated that India's neighbours could invest here only after securing prior government approval. Subsequently, the government also raised tariff and non-tariff barriers to block Chinese goods, similar to the US's 'small yard, high fence' strategy.

But this poses another challenge. Prime Minister Narendra

AS THE WORLD DEVISED THE 'CHINA-PLUS-ONE' STRATEGY TO DIVERSIFY INVESTMENTS IN VIEW OF DISRUPTIONS TO GLOBAL SUPPLY CHAINS, INDIA TOO HAS SEEN AN OPPORTUNITY TO BOOST ITS MANUFACTURING

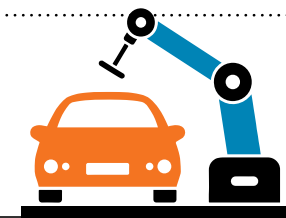
NEED TO STEP ON THE GAS

Taking a cue from China, India should ensure that about 30 per cent of its GDP comes from the manufacturing sector. At present, it contributes just over 13 per cent



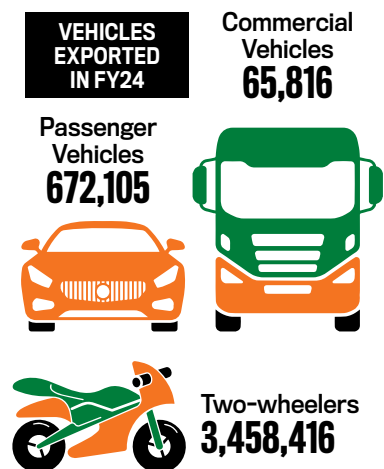
THE KEY DRIVER

A lot will depend on automotive industry, which contributes 7.1% of India's GDP and 4.7% of exports



EXPORT TRENDS

Two-wheelers form the bulk of India's vehicle exports. Other vehicle categories need to catch up too



WHERE INDIA STANDS

India is already competing with the best in the world in the export of automobiles and auto components

Country	Export Value in 2023 (In \$ Mn)*
Germany	229,735
China	199,746
Japan	198,119
US	186,466
India	183,074
South Korea	175,133

*All kinds of vehicles, including two- and three-wheelers, and auto components

Source: *Society of Indian Automobile Manufacturers; trademap.org*

Modi aims for India to become a \$10 trillion (Rs 839.5 lakh crore) economy by 2031-32 from the existing \$3.94 trillion (Rs 331 lakh crore), requiring more than a 12 per cent CAGR. This can't be achieved unless the manufacturing sector starts firing on all cylinders and contributes at least a third of GDP. The Economic Survey indicates that consumption is growing at 4 per cent, roughly half the rate of GDP growth, and capacity utilisation of existing factories remains at 74-76 per cent. A World Bank report, on the other hand, forecasts global growth to stay steady at 2.6 per cent in the current fiscal. The report notes that the major growth engines are not the developed economies of the West, but India and China. This means Indian manufacturers will have to rely more on domestic consumption than on any surge in export demands.

ACCELERATING MANUFACTURING

With India's expanding workforce availability, factories remain big work churners. The Reserve Bank of India's KLEMS (capital, labour, energy, materials, services) database shows 46.6 million added to the organised workforce in the previous fiscal. To accelerate manufacturing, India requires a multipronged strategy: strengthening the ecosystem for intermediary product manufacturing, turning MSMEs from just auxiliary manufacturers for the mother industry to also the makers of new products, and integrating them into the global value chain. In the past four years, India has taken steps in this direction—for instance, the production-linked incentive (PLI) schemes in 14 sectors that incentivise manufacturing of products to substitute imports and capitalise on opportunities that are emerging from the

'China-plus-one' policy, especially in the manufacturing of advanced electronic items and components. Among them is the PLI scheme for automobile and auto components launched in September 2021 to boost the manufacturing of Advanced Automotive Technology (AAT) products, facilitate deep localisation for AAT products and enable the creation of a domestic as well as a global supply chain. The sector continues to be a key driver of the Indian economy, contributing 7.1 per cent to India's GDP and about half of the manufacturing GDP.

India is also focusing on new-age products like electric vehicles (EVs), cleaner hydrogen-based cars, electronics and white goods, active pharmaceutical ingredients (APIs), telecom and networking products, and drones and their components. But despite attracting investments through PLI and tax breaks, India remains short of becoming an immediate beneficiary of manufacturing diversification by the West. For, even for these products, there's dependency on the imports of Chinese equipment. It was perhaps faced with this Hobson's choice that the economic survey made a case for FDI inflow from China, having learnt from the experience of other economies such as South Korea, Vietnam, Thailand and Malaysia that have benefitted from it.

SAFEGUARDING NATIONAL INTERESTS

However, this comes at a time when the Modi regime is repairing its relationship with its ideological parent, the Rashtriya Swayamsevak Sangh (RSS), which sees China as an ideological opponent and does not want New Delhi's interests to become subservient to Beijing's. The RSS and its affiliates working in this arena have been pushing the government to look for alternatives and bring in reforms such as easing out the inverted duty structures that have hit labour-intensive sectors such as textiles and leather. In a research paper written for the New Delhi-based think tank Council for International Economic Understanding, economist Ashwani Mahajan noted that the textile industry in India faces a 9 per cent cost disadvantage on account of levies like the cess on fuel, logistical inefficiencies and cheaper inputs flooding the market through FTAs, especially with the ASEAN countries. Talking to INDIA TODAY, he identified 70 products ranging from chemicals and metals to textiles and electrical and electronic goods that are facing cost disadvantages.

"The PLI is a good start," he says, "but to lay the foundations for the factories of tomorrow, India will have to bring the next level of reforms quickly."

India is investing heavily in railway and highway networks to facilitate the transportation of raw material and goods. The introduction of the Goods & Services Tax (GST) has added to the ease of doing business. But "the availability of land to set up factories and the availability of robust supply lines are still a big challenge", says an industrialist,

speaking on condition of anonymity. Access to cheaper and easy capital is also an uphill task, he adds. In April this year, a report by consulting group EY highlighted that preferential duty structures in FTAs with countries having strong manufacturing capacities, like ASEAN, South Korea and Japan, have created an uneven playing field for Indian manufacturing. The report identified several factors, including taxes outside GST, higher input costs, expensive capital, and high energy and logistics expenses, as contributing to the disadvantage of India's manufacturing sector. This gives vital pointers to the government to recalibrate India's multilateral and bilateral trade agreements for achieving a level playing field between imports and domestic manufacturing.

But a change is visible. In fact, the EY report noted that since 2010-11, when FTAs were implemented, India has eliminated 75 per cent of its tariffs, covering nearly 90 per cent of tariff lines. In 2019, India pulled out of the Regional Comprehensive Economic Partnership (RCEP), conceived at the 2011 ASEAN Summit, and has never given heed to the Belt and Road Initiative (BRI) pushed by China. Instead, India has decided to go for bilateral agreements with the UAE and Australia and has entered into a Trade and Economic Partnership Agreement (TEPA) with EFTA countries (Switzerland, Iceland,

Norway and Liechtenstein) besides negotiating trade deals with the US, UK and EU. This reflects a change in strategy, as these new geographies may not supply cheaper inputs but open up markets for Indian products. Another industrialist, speaking anonymously, suggests that while the focus is on strengthening manufacturing, it should be done in a "synergised way". "Look at the final product," he adds, "and do backward integration, cleaning up the inverted duty structures which make the products uncompetitive and ineffective." If done right, it could very well help India achieve its ambitious growth targets and become a global manufacturing hub. ■

TAKEAWAYS

➤ **If India wants to become a \$10 trillion economy by FY32, manufacturing sector will have to start firing on all cylinders**

➤ **The government should strengthen the ecosystem for intermediary product manufacturing and turn MSMEs from just auxiliary manufacturers to also makers of new products and integrate them into the global value chain**

➤ **India needs to recalibrate its trade agreements for achieving a level playing field between imports and domestic production**

FOCUS INDUSTRIES

POWERING THE NATION'S ENERGY SELF-RELIANCE



In the midst of India's rapid economic transformation, driven by a push for growth and a renewed focus on sustainability, the Gujarat Mineral Development Corporation (GMDC) is making significant strides. GMDC has been a vital pillar of Gujarat's industrial sector through its extensive lignite mining operations across the state for over six decades. This year, GMDC has notched its third-best financial performance showcasing the organization's resilience & adaptability to stay abreast with the changing market dynamics.



Expanding Energy Frontiers

Historically, GMDC has been renowned for its extensive lignite mining operations across Gujarat's Kutch, Bhavnagar and South Gujarat regions, where it has fueled industries and secured energy needs with "Brown Gold." Adding to its existing lignite operations, GMDC plans to launch six new lignite mines across Gujarat, which will significantly increase the organization's lignite production capacity and contribute to regional energy stability.

Moving beyond geographic boundaries, GMDC is venturing into coal mining with new acquisitions in Odisha. This expansion is part of a broader strategy to enhance energy reserves for Gujarat and the wider Indian market. Supporting this expansion, GMDC has received preliminary approval to acquire land in the Baitarni West region.

Additionally, it has also entered into a strategic MoU with Gujarat Urja Vikas Nigam Limited (GUVNL) for 4400 MW thermal power plant, utilizing newly acquired coal blocks.

Enhancing Gujarat's Power Grid

Akrimota Thermal Power Station (ATPS) in Kutch District, Gujarat, has been a crucial part of GMDC's portfolio, providing reliable power to Gujarat's grid. In line with modern energy demands, GMDC is committed to enhancing the efficiency and output of ATPS. This endeavor will not only increase power output, but also support the local economy & boost regional growth.

Furthermore, GMDC is embracing renewable energy as a core component of its operational strategy. The company has invested in wind farms totaling 200.9 MW located across Kutch, Porbandar, Devbhumi Dwarka, Jamnagar, Rajkot, and Bhavnagar. In Solar Energy, GMDC has developed a 5 MW solar power facility at Panandhro, reflecting a significant shift towards sustainable energy sources.

Together, these initiatives underscore the company's dedication to sustainable energy production and its commitment in driving the transition towards a greener, more resilient energy future.

Investing in Critical Minerals for the Future

GMDC is setting its sights on critical minerals that are vital for future technologies. One of the standout projects is the Ambaji Copper Project, located in the mineral-rich area of Ambaji. Spanning 184 hectares, this site is one of the largest copper deposits globally, valued at approximately US\$ 3 billion. This project places GMDC at the forefront of the global copper market, crucial for supporting the growing electric vehicle and renewable energy sectors.

Furthermore, the organization is also advancing its capabilities in Rare Earth Elements (REEs) with the development at Ambadungar, in Chhota Udepur District, Gujarat. These elements are essential for modern applications such as EVs, wind turbines and various high-tech uses.

As India's rapid economic transition is taking shape, GMDC is not merely keeping pace with the nation's developmental aspirations but is actively working towards strengthening its energy self-reliance.



Government of India
Ministry of Chemicals & Fertilizers
Department of Pharmaceuticals



Pradhan Mantri Bhartiya Janaushadhi Pariyojana

AFFORDABLE MEDICINES FOR ALL

In last 10 years, there has been more than 150 times growth in number of Kendras which were only 80 in 2014 and have now grown to more than 12500 Kendras covering almost all the districts of the country. Hon'ble Prime Minister in his Independence Day speech, 2023 has announced for opening of 25,000 Pradhan Mantri Bhartiya Janaushadhi Kendras (PMBJKs) across the country.

India is one of the leading exporters of generic medicines to the world. The branded generic medicines are significantly expensive than their un-branded generic equivalents, though they are identical in their therapeutic value. Further, as per the 71st Round of the National Sample Survey Office (NSSO) on Health in India, purchase of medicine accounted for around 72% in rural sector, and 68% in urban sector, of the total expenditure on non-hospitalized treatment of ailments. Therefore, making available reasonably priced quality medicines in the market benefits all the citizens.

The Department of Pharmaceuticals under Ministry of Chemicals & Fertilizers, Government of India has been taking several regulatory and fiscal measures from time to time towards realizing this objective.

87% of drugs dispensed in India are branded generics, i.e., generic drugs sold with brand names. The need is to focus on unbranded medicines to save expenditure on medicines for all citizens.



THE JOURNEY OF PMBJP

The PMBJP was launched in November, 2008 with an objective of having at least one Jan Aushadhi store in each district of the country but the scheme faced innumerable obstacles in realising its objectives. The Narendra Modi Government revamped the 'Jan Aushadhi Scheme' in 2015 as 'Pradhan Mantri Jan Aushadhi Yojana' (PMJAY). To give further impetus to the scheme, it was again renamed as Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP). As on 30.06.2024, there are more than 12,500 PMBJP Kendras functional across the country.

SALIENT FEATURES

Universal Availability

In next two and half years, 15 thousand new Jan Aushadhi Kendras will be opened across the country

Wider Product Range

More than 2300 quality medicines and surgical equipments are available at Jan Aushadhi Kendras

Huge Savings

Rs. 28,000 Crores saved through Jan Aushadhi in last 10 years

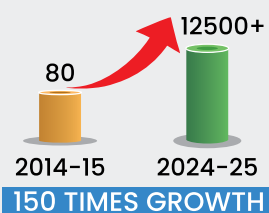
Financial Assistance

Financial assistance to the Jan Aushadhi Kendra operators and sales based incentive

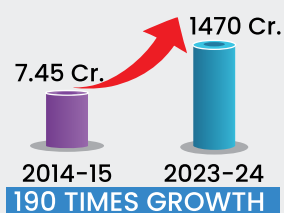
Special Incentive

Provision of special incentive of Rs. 2.00 Lakh for Women, Divyang, Ex-servicemen, SC/ST, Island, Himalyan and North Eastern States applicants

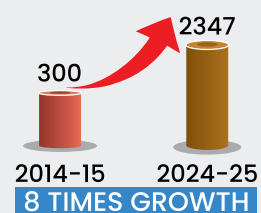
Kendra (Outlets)



Sales



Product Basket



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How to Open
Jan Aushadhi Kendra



**Dr. Arunish Chawla, IAS
Secretary**
Department of
Pharmaceuticals
Ministry of Chemicals
& Fertilizers,
Govt. of India

Pradhan Mantri Bhartiya Jan Aushadhi Pariyojana is a flagship scheme, which aims to provide high quality generic medicines to citizens across the country. More than 12,500 Jan Aushadhi Kendras are working across the country to realize the vision of Hon'ble Prime Minister Shri Narendra Modi Ji.

Suvidha Sanitary Napkin Scheme has also been launched under which sanitary pads are being made available at one rupee at all Jan Aushadhi Kendras. Jan Aushadhi Project is not only contributing to development of India's pharma sector, but will also help in providing affordable healthcare to citizens in the coming years.



Ravi Dadhich
CEO, PMBI

Affordable and High Quality Generic Medicines have saved approx. **Rs. 28,000 Cr.** of the common citizens in last 10 years. PMBI is progressing at fast pace to increase these kendras upto **25,000**.

INDIA AS THE 'PLUS ONE' TO CHINA

As the world looks beyond China, India can emerge as an alternative only if we are capable of competing globally in terms of cost, quality, customer service, capital productivity, innovations and branding

In the last several decades, many countries that transitioned from the middle-income to the high-income status benefited from either joining the large European market or being endowed with natural resources like oil and gas. There are notable exceptions, like South Korea, Taiwan and Israel, who have avoided the middle-income trap through manufacturing backed by R&D and innovations. Some countries used commodity exports or manufacturing and did well for some time, but eventually floundered. In this backdrop, India will have to create its own path to prosperity, where manufacturing will play a key role. Still, it will have to be a multi-dimensional story, with growth being inclusive and sustainable. We will have to go up the value chain based on cutting-edge innovations but will at the same time also need labour-intensive industries to employ our youth gainfully.

Disruptions to global supply chains owing to geopolitics and Covid have made countries and businesses adopt the 'China-plus-one' strategy, that is, look for alternatives to the Asian giant. However, India will not be the only player vying to be the 'plus one' to China. To be a big player in manufacturing, we must be able to compete globally in terms of cost, quality, customer service, capital productivity, innovations and branding.

The government has taken several steps to improve the cost competitiveness of Indian industry. These include huge investments in physical and digital public infrastructure, launching production-linked incentive (PLI) schemes and the Goods and Services Tax (GST) regime, and reducing corporate tax rates. The areas where India needs to put in more work to achieve competitiveness vis-à-vis its peers are the costs of logistics and capital—these need to be reduced by 300-400 basis points each.

India had missed the first two industrial revolutions, and we were a much smaller economy when the third revolution took place. The fourth revolution or Industry 4.0 plays to India's strengths. Cyber-physical systems, nano factories, artificial intelligence/ machine learning-based forecasting, nerve centres for cognitive and predictive decision-making, robots and additive manufacturing etc will have to be adopted at scale to reduce costs

and enhance people and capital productivity. Leveraging GST and harnessing Industry 4.0 practices have enabled expansive supply chains like Hindustan Unilever's to reduce the number of fulfilment centres and set up multi-product/ format factories closer to the source of demand. Adopting technology across its value chain, it has factories recognised by the World Economic Forum as 'digital lighthouses' and has one of the lowest conversion costs and highest capital productivity in the FMCG industry across the world.

Quality management: Improving quality and customer service must become an obsession in Indian industry. This will entail implementing quality management systems, robust mechanisms for capturing and ana-



Illustration by NILANJAN DAS



By Sanjiv Mehta

lysing customer feedback, adopting Customer Relationship Management (CRM) systems, benchmarking and fostering a customer-centric and continuous improvement culture.

R&D and innovations: A big change our country must make is around R&D and innovations. India spends less than 1 per cent of its GDP on R&D. South Korea, Taiwan and Israel spend 3-5 per cent and China about 2.5 per cent. It is not just about increasing the quantum of money we spend but where and how we spend it. China files over 20 times the number of patents India does. The sweet spot of innovation is where you meet the unmet needs, at costs that are competitive and where you appropriate a large part of the value chain. To differentiate ourselves, this will have to be supplemented by products that are high on sustainability.

We will have to build innovation ecosystems where public sector as well as private sector R&D, academia, venture capitalists and start-ups come together. For instance, Wageningen University in the Netherlands, recognised for its research and innovation in agriculture, food sciences and biotechnology; the MIT Media Lab in Boston, renowned for its cutting-edge interdisciplinary approach to research; and the Hsinchu Tech Park in Taiwan, known for its R&D in semiconductors, electronics and telecommunications, are great examples of innovation ecosystems.

Nurturing MSMEs: Also, MSMEs will have to be nurtured by enhancing their presence and leveraging their strengths. We must create greater ease of doing business, provide higher access to capital and technology and assist them in reducing their carbon footprint. Manufacturing cannot break into a gallop without skill sets that match industry needs. This will entail extensive vocational training, deploying digital tools for efficiency and scalability of upskilling and reskilling. In tandem with growth in manufacturing, we will have to take concrete steps to build brands that are differentiated and recognisable across the world.

India and its numerous states will have to focus on industries where they have a competitive edge or where it can be created. In sunrise sectors, we should look at drones, space, modular nuclear reactors, renewable energy, smart mobility and life sciences. In labour-intensive sectors, the focus should be on leather products, handicrafts, furniture, garments and agro-processing, among many other sectors. India has the foundation, the entrepreneurial zeal, the drive—of both the government and its people—and the right external context to become a 'product nation'. Let us not miss this opportunity. Our destiny beckons us. ■

The author is Executive Chairman, L Catterton India, and former CMD, Hindustan Unilever Ltd

THE GIANT STEPS

India spends less than 1 per cent of its GDP on R&D. It is not just about increasing the quantum of money we spend but where and how we spend it

We will have to build innovation ecosystems where both public and private sector R&D come together

Industry 4.0 plays to India's strengths. Cyber-physical systems, nano factories, AI-based forecasting etc will have to be adopted at scale to reduce costs and enhance people and capital productivity

Manufacturing cannot break into a gallop without skill sets that match industry needs. This will entail extensive vocational training and digital tools



By Naushad Forbes

FIRING INDIA INC'S AMBITION

India has the potential to become a global giant in manufacturing. For that, our industry must take bold steps forward and the government a step back

This special issue of INDIA TODAY asks: **How can India become a global giant?** That eventual outcome is not in doubt. If we keep growing at the 6.5 per cent we have averaged for the past 30 years, we will soon be one of the three largest economies in the world.

We will go on to be a huge economy by 2047, by dint of having the world's largest population. But we will not yet be rich—as an upper-middle income country, we will be well below today's developed world. To do better, we must place manufacturing and the ambition of Indian firms at the heart of development.

First, a word about policy: this is not an article arguing that the government must do a list of things. The state's role, in my view, is to limit itself to only those things that only it can do. In manufacturing, the state should primarily adopt a hands-off approach—don't choose technologies, don't select firms, don't promote particular industries, and don't incentivise particular sectors. That is, enable all of Indian industry; don't attempt to pick winners. Our industrial policy should seek a future that looks like Germany, with thousands of specialised world leaders, rather than China or South Korea, each with a few dozen giant state-sponsored champions.

But if I ask less of the state to make us a great power more quickly, I ask much more of Indian industry. As I have argued at length in my book, *The Struggle and the Promise: Restoring India's Potential*, Indian industry must strive to be more of these four I's: inclusive, international, innovative and independent.

1. Inclusive: In the 1990s and 2000s, the Indian consumer goods industry grew at a rate faster than GDP. The latest Economic Survey indicates that consumption is growing at 4 per cent, roughly half the rate of GDP growth. This is a failure of inclusion. We have millions eager to become first-time buyers of restaurant meals, refrigerators, hospital services, holidays, motorcycles, ready-made clothes and toothpaste. We need to bring 700 million more into the consumer class. If we do this, we will create wealth for all of Indian industry. This will take a focus on skills and education in everything Indian industry does beyond its gate. The 2024 budget supports this activity with incentives for internships; it is in our collective industrial interest to improve school outcomes and skill our population.

2. International: Indian firms must increasingly operate around the world, investing in brands and markets. As Martin Wolf recently pointed out in a talk in Delhi, if our trade to GDP ratio stays at the same level, Indian firms should, in 20 years, expect to export more than our total current GDP.

Are we gearing up to do so? Do we have the confidence to allow the world's best firms (yes, including Chinese ones) to invest in and sell in our market, as we use their inputs to add value and export our goods around the world? Are we pushing our commerce ministry to sign preferential trade deals with Asia, Africa and Latin America, markets that will provide most of the world's growth for the next 20 years? Indian industry is welcomed around the world. We are seen (unlike our northern neighbour) as benign. We should take advantage of our welcome.

THE GIANT STEPS

Our industrial policy should seek a future that looks like Germany, with thousands of specialised world leaders, rather than China or South Korea, each with a few dozen giant state-sponsored champions

Indian industry must strive to be more of these four I's: inclusive, international, innovative and independent

We must deal with the government as equals, praising where praise is due, but criticising when criticism is called for

3. Innovative: Indian industry is more skill- and capital-intensive than other countries at our level of development. Industrial success, thus, requires much greater focus on R&D. Indian industry's investment in R&D is around 0.3 per cent of GDP. We need to expand this by many times to match the world average of 1.5 per cent. I have written at length about this both in my book and in my columns. Let me focus on one point here: ambition. Do we aspire for world leadership, as multinationals with Indian roots? Have we developed products and services that truly lead the world, that meet the needs of consumers and industry better than any other firm does? And are we backing up that ambition to lead with investment on the ground, in world-leading manufacturing plants with the capacity to serve global demand?

4. Independent: Decades of Licence Raj bred a private sector that looked to government for protection and favours. A private sector dependent on the government cannot speak with an independent voice. Post 1991, the Licence Raj retreated, but the deference that industry accords to government continues as a hangover. We must deal with the government as equals, praising where praise is due, but criticising when criticism is called for. We must stop asking the government for things. Let the government respond by trusting industry to do right. And let industry repay that trust. Industry and government must be as tough, demanding and unforgiving of each other as they are mutually respectful. ■

The author is Co-chairman, Forbes Marshall, and Past President, CII. His book, The Struggle and the Promise: Restoring India's Potential, has been published by HarperCollins

MAKING A GLOBAL MARK

Indian industry has to seize the Make in India moment and take advantage of the opportunities the government is creating through its enabling business and foreign policies to become masters of the world, not just of their home ground

Government policies can result in slowing manufacturing and making it non-competitive.

They can encourage unethical management practices. This is apparent from the outcome of industrial policies framed after 1950. The abolition of the licence and control system in 1991, along with the creation of conditions to facilitate competition, brought about some positive change. However, it was only after 2014 that the government implemented policies that removed most of the obstacles to competitive manufacturing. The ease of doing business programme, introduction of GST (Goods & Services Tax), trusting the private sector to lead manufacturing growth, fiscal prudence and



Illustration by **NILANJAN DAS**

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THE GIANT STEPS

- ▶ Like the car component industry, Indian manufacturers need to rapidly expand their engineering, design and manufacturing capabilities
- ▶ They have to start thinking on a much bigger scale and enlarge their ambitions. They have to want to play with the big boys and win rather than be champions in a minor league
- ▶ The scope for increasing exports is huge. The global trade in auto components and accessories in FY23 was \$1,862 bn. Our share? Just over 1%

several other reforms have created a favourable environment for the growth of manufacturing activity. The budget of 2024 carries forward this objective.

While government policies can determine whether manufacturing can flourish or not, they cannot actually result in accelerating manufacturing growth. The pace of growth would always be determined by the actions of companies. Companies where managements are solely committed to the growth of their companies perform much better than companies whose assets and resources are treated as the personal property of the promoter. Siphoning money from the company significantly weakens growth and competitiveness by reducing the capability to make investments in R&D and expansion. Manufacturing growth in India has been adversely affected due to undesirable management practices developed prior to 1991. That largely explains why the contribution of manufacturing to GDP remains under 16 per cent.

Advantage India: The manufacturing-friendly policies of the present government, allied to the geopolitical scene, have created a situation where locations outside China are being sought for manufacturing. The foreign policies of the government have created a very favourable environment for us and India has become a very acceptable choice for locating manufacturing activities.

The auto component industry is possibly best situated to take advantage of the global situation. Our car industry has been growing steadily and we are now the third largest car market in the world. The component industry has grown even faster, thanks to the policy adopted by Maruti Suzuki India Ltd in 1983 to treat component manufacturers as partners and work with them to keep improving their competitiveness. The component industry in 2023-24 had a turnover of Rs 6.14 lakh crore and its compound annual

growth during the past 20 years has been 16.69 per cent, far above the manufacturing sector as a whole. Component exports in 2023-24 reached \$21.2 billion (Rs 1.75 lakh crore), doubling in a nine-year period.

The scope for increasing exports even more is huge. The global trade in automobile components and accessories was \$1,862 billion in 2022-23. Our share was just over 1 per cent. The industry needs to rapidly expand its engineering, design and manufacturing capabilities. Component manufacturers have to understand the opportunities that the world offers and how these opportunities are within reach. They have to start thinking on a much bigger scale and enlarge their ambitions. They have to want to play with the big boys and win and not be satisfied by being champions in the third league. Mindsets have to change. There are instances of component manufacturers having done this. For example, the Motherson group has a turnover of almost Rs 1 lakh crore and is among the top 15 component makers in the world.

Time to pivot: Component manufacturers have to enlarge their engineering capabilities and enhance their ability to compete by being able to quickly meet changing customer demands in a reliable manner. In many cases, this may require companies to form joint ventures with foreign partners. The traditional thinking of retaining majority control may need to be modified in the interests of being able to grow rapidly. Companies will also have to look at their management style and consider how to reduce costs, increase profits and generate capital for investment in building engineering capabilities and other critical areas. Frugal and ethical management is essential for this purpose.

The component manufacturers in India have a great advantage in that the domestic production of cars, which has crossed four million, is expected to reach eight million in the next eight years. Further growth is inevitable. The steady increase in domestic demand will derisk their investments in creating capabilities to cater to overseas markets. India has abundant resources of people with the skills required for engineering and manufacturing. Labour is abundant. No other country can offer these advantages.

What applies to the component manufacturing industry also applies to many other segments of manufacturing industry. Entrepreneurs and promoters have to think big and long-term. They have to want to experience the thrill of their companies being amongst the biggest in the world. Wealth will come to them as their companies grow, but they will realise that no amount of money can equal the pleasure and happiness that comes from contributing to national growth and benefitting millions of people. This is now India's moment. Industry must take advantage of it. ■

The author is Chairman, Maruti Suzuki India



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DRONE AND ROBOTICS EXPERIMENTARIUM

The Drone and Robotics Experimentarium (DARE) Lab is a state-of-the-art teaching and research facility that aims to be a premier center for Drone and Robotics research. The lab has Autonomous Drones, Industrial Robotic Arm, Autonomous Rovers, Humanoid Robot, Quadruped Robot and Robotics Workstations. All drones and robots present in the lab are fully programmable. There is no need for manual control or human intervention in their operation. All workstations come with Wi-Fi and Bluetooth communication in order to interface with the drones and robots.



CENTRE FOR ADVANCED STUDIES

Sathyabama Centre for Advanced Studies, a state-of-the-art facility established with Advanced facilities that ensembles the conjunction of academic and research expertise. The Centre houses Artificial Intelligence Laboratory with Supercomputing facilities, DARE (Drone and Robotics Experimentarium) Lab consisting of Robotics Workstations, Swarm drones, Quadruped Robot, Humanoid Robot and autonomous rovers, Advanced Characterization facility with HRSTEM, FESEM and XRD Development tools, Media Centre and Centre for Innovation and Technology Transfer.



METVERSE STUDIO

The Metaverse Studio is a futuristic facility that transforms creativity and imagination into interactive and immersive experiences. Using cutting-edge high-performance development systems and Head Mounted Displays, this studio has a lot to offer for XR designers, XR engineers and Game developers. The studio also houses an immersion zone to fully engage yourself in the metaverse. The Metaverse Studio encompasses Development Space, Metaverse Stations, Nvidia Ampere Architecture, Ray Tracing, AI DLSS, Nvidia Reflex, Blender to XR Development Tools, Unity Game Engine, Unreal Engine, Immersion Zone and Ideation Area.



CENTRE FOR INNOVATION AND TECHNOLOGY TRANSFER

The Centre for Innovation and Technology Transfer aims to be a leading private deep-tech startup hub. The Centre will support students, scientists, faculty, alumni members and external entrepreneurs in creating successful deep tech startups, and translating benefits to the society. The Centre nurtures technology ventures by providing technological and business support to help entrepreneurs establish business ventures. In addition to this, the centre supports the University's scientists and faculty in product development, industry connect and commercialization.

ADVANCED CHARACTERIZATION FACILITY

Advanced Characterization facility like X-ray Diffractometer (XRD), Field Emission Scanning Electron Microscope (FESEM) and High Resolution Scanning Transmission Electron Microscope (HRSTEM) are available at the centre which can be used for understanding the structure, composition, shape, size and morphology of different kinds of materials at Nano scale.

MEDIA CENTRE

A Media Centre with state of the art infrastructure has been set up to facilitate preparation of e-content. This Centre helps the faculty in creating high quality Video Lectures and e-content to support online teaching-learning process.

AI SUPERCOMPUTING FACILITY

The AI Supercomputing Lab is a groundbreaking AI research facility that aims to become a strong center for AI research. This lab aims to train and engage students and researchers in cutting-edge AI algorithms and its applications. The facility houses a 95-node supercomputer with 9.6 Peta FLOPS of AI performance. A tiered storage architecture is adopted to utilize flash storage and hence make data server provide industry-topping data speeds.

CENTRE FOR OCEAN RESEARCH

APPLIED PHYCOLOGY LAB

The Applied Phycology lab with advanced instruments like a Continuous Flow Analyzer (Auto Lab), ATR-FTIR, and Multimode reader explores the potential aspects of algae across different domains including biotechnology, environmental sustainability, and other industrial applications. This lab primarily works on algal adhesion and its consequences in the marine environment to highlight the efforts in developing eco-friendly techniques in combatting marine biofouling problems. Also it focuses on micro algal culture techniques to enhance biomass production and in macro algal population, for spore based seed production.

BIOMOLECULES SEPARATION LAB

The Biomolecules separation lab equipped with Thin-layer chromatography (TLC) and High-performance liquid chromatography (HPLC) used to isolate novel molecules from Natural Resources. This lab provides precise quantitative analysis by separating biomolecules based on their affinity for the stationary phase under high pressure. Through this multi-step process, scientists can effectively separate and analyze biomolecules present in diverse biological samples with accuracy and efficiency. These finds will helpful in designing new compounds or molecules for Environmental and Biomedical application.

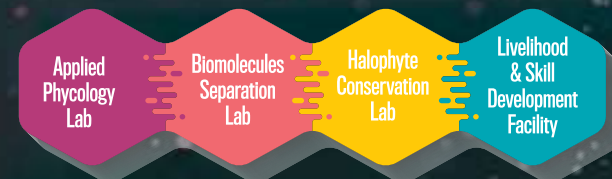
HALOPHYTE CONSERVATION LAB

Halophyte Conservation Lab conducts applied research to perform field and laboratory studies on seagrasses, seaweeds and mangroves. The experiments accomplished will integrate the management strategies for conservation and restoration initiatives of highly productive ecosystems. In-vitro micropropagation and mesocosm chamber in this lab, is used for warming and acidification experiments and to induce halophyte cells by novel methods for the purpose of natural product research, metabolic engineering and conservation aspects.

LIVELIHOOD AND SKILL DEVELOPMENT FACILITY

Livelihood and Skill Development facility is created to empower the youth with adequate skill sets that will enable their employment in relevant sectors and also improve productivity. The facility with associated labs and advanced instrumentation conducts capacity building through Skill development programmes. The trained youth will be encouraged with Institutional Seed fund to develop their own commercial products. In addition, the facility enables to scaleup their finished product to marketable viable product through Sathyabama Technology Business Incubator.

CENTRE FOR OCEAN RESEARCH



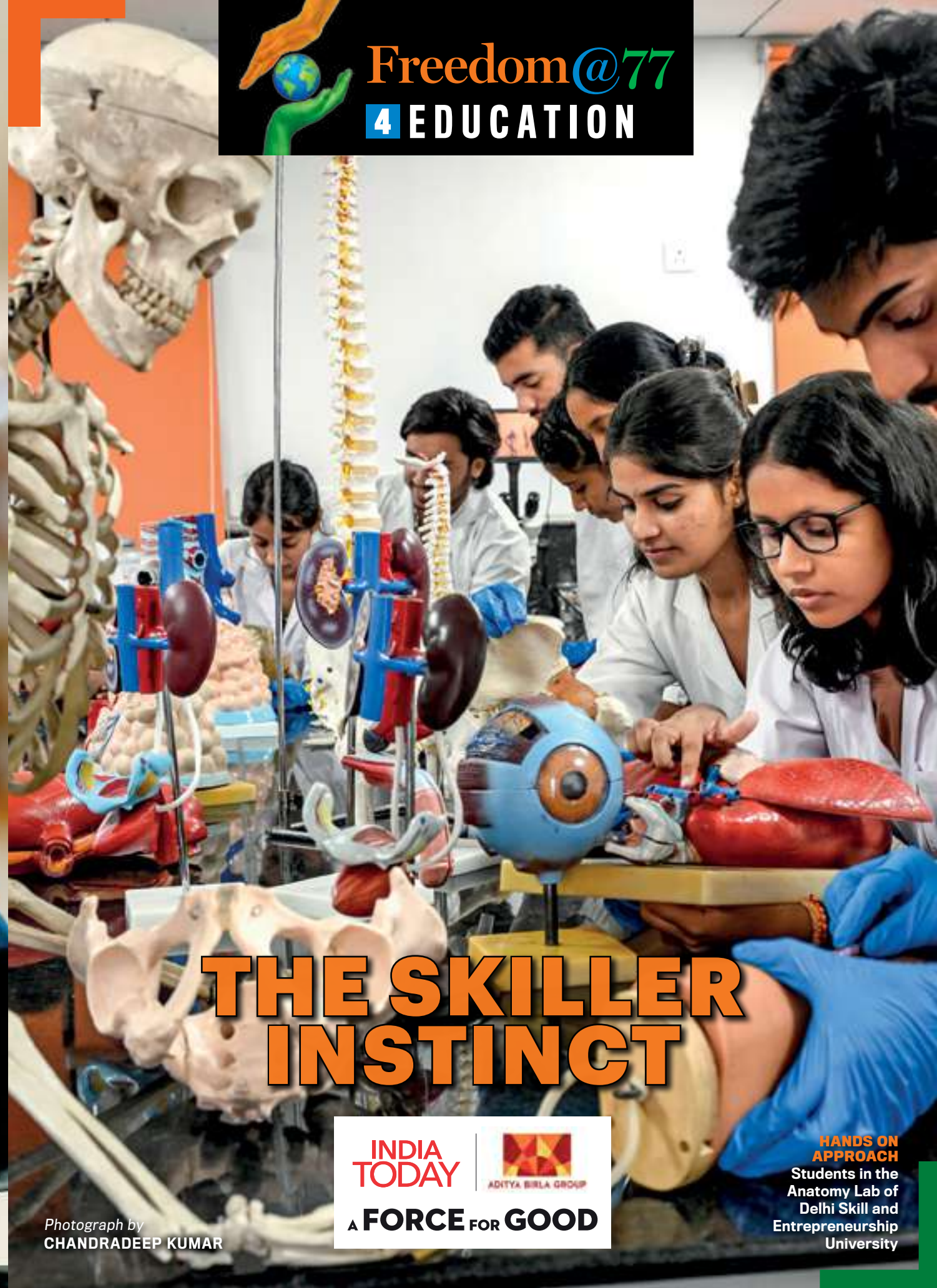
OFFICE OF THE INTERNATIONAL RELATIONS & HIGHER STUDIES

The office of the International relations facilitates collaboration with International Universities for activities including Student Exchange, Faculty Exchange, Joint Research and other Collaborative activities for the benefit of the students and faculty. The office also initiates Semester Abroad Programmes, Internship Abroad Programmes and Summer Schools with Partnering Universities for the students of the Institution. The office also facilitates Faculty and Student Mobility programmes Funded by International Funding Organisations. The Office of the Higher Studies helps in identifying and selecting the Universities to pursue Master Degree Programmes, provides support in the process of application, Letters of Recommendation and organises awareness programmes on Higher Education opportunities for the Pre final and Final Year Students. The Office conducts foreign language classes and other courses like TOEFL, IELTS for the students.



MAKERSPACE

Makerspace is a state of art additive manufacturing facility established to foster innovations in young engineers, facilitate research and support additive manufacturing in industries. This unique facility is distinguished as a "Centre of Excellence for Additive Manufacturing" by Sratasys,India. Makerspace includes labs for material synthesis & testing, prototype designing and tissue engineering.



THE SKILLER INSTINCT



HANDS ON APPROACH
Students in the Anatomy Lab of Delhi Skill and Entrepreneurship University

Photograph by CHANDRADEEP KUMAR

TURNING A NEW PAGE

The grave deficiencies in India's education system have been addressed by the National Education Policy 2020. To reach global standards, it must be implemented in letter and spirit

By **Kaushik Deka**

India boasts a storied legacy of educational excellence, harking back to the ancient institutions of Nalanda and Taxila. Even today, it has one of the largest education ecosystems in the world, encompassing nearly 1.5 million schools, more than 40,000 colleges and over 1,000 universities, which together serve nearly 300 million students.

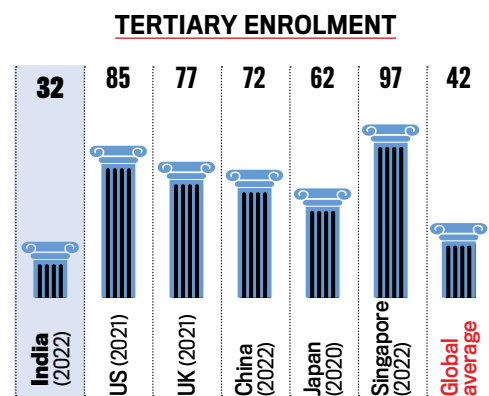
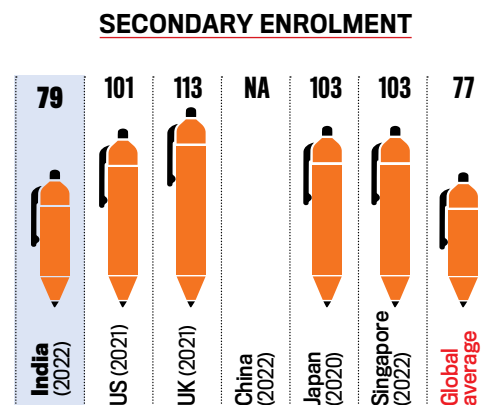
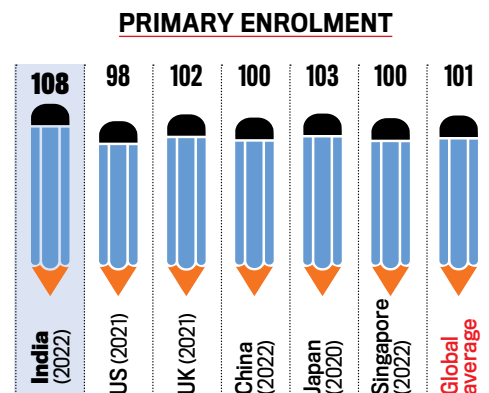
However, this quantitative advantage has not translated into qualitative success. For instance, while India boasts a Gross Enrolment Ratio (GER) of 108 per cent for primary education (check the accompanying graphic for why it exceeds 100 per cent), it plummets to around 79 per cent for secondary education. In contrast, China maintains a 100 per cent GER for primary education and 89 per cent for secondary education, reflecting better student retention. India's GER for higher education is even more dismal, languishing at a dismal 27.1 per cent, a figure that is half of China's and pales in comparison to the US's impressive 88 per cent. Exemplary education systems like those in Finland and South Korea achieve nearly 100 per cent GER across all school levels.

STATE OF INDIA'S EDUCATION

It has to improve higher education Gross Enrolment Ratio, emphasise research and increase skilling

THE LONG ROAD TO SCHOOLS AND COLLEGES

In primary/secondary enrolment, India is up there. In higher education, it is a poor performer



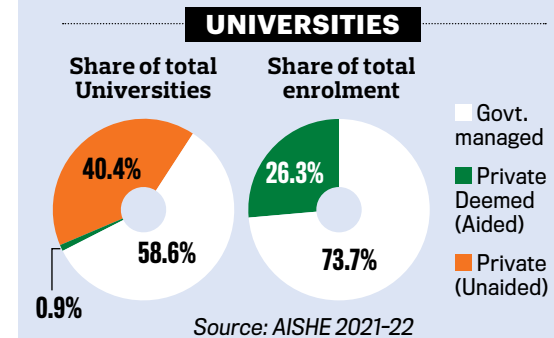
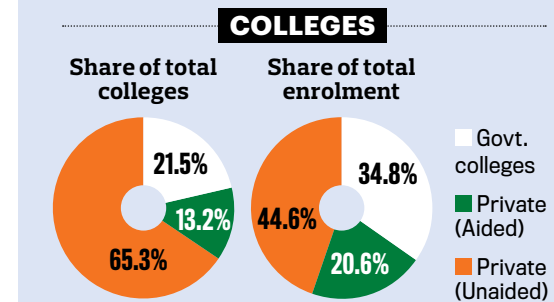
Note: This is gross rate, which includes children of any age entering the level of education. This can result in percentages greater than 100 because children may enter education late or repeat a year. Source: World Bank, Gender Statistics (based on multiple sources); UNESCO; *2023

Graphic by **TANMOY CHAKRABORTY**

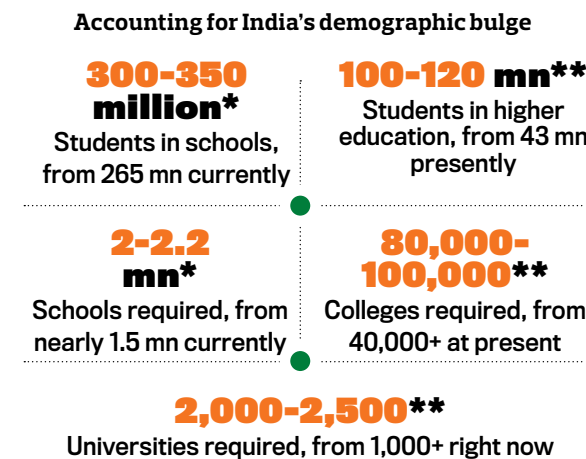
EDUCATION

THE HIGHER EDUCATION UNIVERSE

Of 48.3 million students, 78.9% are enrolled in undergraduate level courses and 12.1% are enrolled in postgraduate courses



EDUCATION IN 2047



*Because of declining birth rate, demand for higher grades will rise, but primary grade enrolments might stabilise or decline, to achieve a pupil-teacher ratio of 15:1 in primary grades and 20:1 in higher grades **For about 60 per cent GER by 2047

If these statistics highlight a substantial gap in educational access, the quality of learning outcomes is even more alarming. The National Achievement Survey (NAS) by the ministry of education revealed that only 45 per cent of fifth-grade students could read at a second-grade level. Similarly, the 2023 Annual Status of Education Report (ASER) found that one-fourth of rural students aged 14-18 could not fluently read a second-grade level text in their regional language.

In higher education, despite the expanding ecosystem, few institutions achieve respectable positions in global rankings. While universities in the US and UK dominate, Chinese institutions are rapidly climbing the ranks. This disparity is unsurprising, given India's lag in research output, exacerbated by the country's meagre investment of less than 1 per cent of GDP in research and development (R&D) within higher education. In contrast, the US allocates nearly 3 per cent of its GDP to R&D, and China invests over 2 per cent, significantly boosting its global research output and innovation. Although there has been an uptick in research publications from India, their impact and citation indices remain low.

The scenario is equally troubling in skill training, where a mere 4 per cent of India's workforce receives vocational education. This is in stark contrast to China's 24 per cent, and the over 75 per cent seen in Germany and Switzerland. Moreover, the employability rate of Indian graduates is approximately 48.7 per cent, suggesting that over half of the graduates lack the skills necessary for the job market.

ENTER THE NEP

We have the world's largest population aged between 10 and 24 years. Reviving education and skill development is absolutely critical to reap this demographic dividend and capitalise on opportunities in a knowledge economy. It was to accomplish exactly this goal that the National Education Policy (NEP) 2020 was drafted.

The NEP proposes a comprehensive overhaul of the Indian educational framework, replacing the 10+2 structure with a 5+3+3+4 model that aligns educational stages with developmental stages—Foundational (ages 3-8), Preparatory (ages 8-11), Middle (11-14), and Secondary (14-18). It emphasises experiential learning and critical thinking, reducing curriculum content to core essentials to foster in-depth un-

INDIA HAS THE HIGHEST NUMBER OF STEM GRADUATES WORLDWIDE. IMPRESSIVELY, OVER 40 PER CENT OF THEM ARE FEMALE. THIS HAS TO BE LEVERAGED BY GIVING THEM ADEQUATE SKILLS TRAINING

derstanding. The policy aims for a 100 per cent GER from preschool to secondary level by 2030, with special initiatives to reintegrate dropouts.

In higher education, the NEP advocates transitioning to large, multidisciplinary and research-focused institutions to foster cross-disciplinary learning, aiming to establish at least one such institution in every district. Additionally, the policy calls for greater autonomy for institutes and encourages enhanced collaboration with industry for practical exposure. The policy also aims to integrate vocational education into mainstream education, with a goal of at least 50 per cent of learners being exposed to vocational training by 2025.

THE DEVIL IN THE IMPLEMENTATION

However, as the past four years have shown, nationwide implementation of this extensive policy is a monumental task fraught with challenges. While the NEP was formulated by the Union government, its successful execution relies heavily on active state cooperation. Several Opposition-ruled states have voiced strong objections to key provisions of the NEP and their implementation. The Centre must navigate the principles of cooperative federalism and decentralisation to roll out these initiatives.

Budget allocation is another challenge. NEP 2020 recommends yanking up spending on education to 6 per cent of the GDP to achieve its goals. However, India's public expenditure on education—by the Centre and the states—has never exceeded 3 per cent of the GDP. Bridging this funding gap is crucial for implementing this expansive programme.

Many schools and colleges face infrastructure issues and a lack of basic amenities. Instead of just brick-and-mortar additions, leveraging technology and expanding digital infrastructure are essential to democratise access to quality education. India needs a world-class online education model tailored to its specific needs, with platforms such as SWAYAM and DIKSHA playing significant roles. But the challenge ahead is substantial even there; for instance, 53 per cent of schools in India lack computers, and 66 per cent lack internet connectivity.

While the NEP emphasises improving research output, neither the Centre nor the states have significantly increased funding for research. Collaborations with industry should also be encouraged to incentivise high-quality research. The NEP envisions a more learner-centric culture, requiring a significant shift in mindset among students, teachers and

administrators. This transformation involves adopting inclusive teaching and learning methods. Consequently, teachers must be trained in new skills to meet these demands.

Globally, there is a growing consensus on the vital role of STEM (Science, Technology, Engineering and Mathematics) education in preparing students for future demands. A UNESCO report highlights that India has the highest number of STEM graduates worldwide, with 34 per cent of all graduates coming from STEM fields. Impressively, over 40 per cent of them are female. However, many of these graduates lack the necessary skills for future jobs.

The NEP emphasises integrating STEM education into the curriculum to enhance students' critical thinking, problem-solving skills and innovation. The key to addressing this skills gap lies in providing hands-on learning experiences and exposure to modern technology. The National Skill Development Corporation (NSDC) estimates that improving skill training in India could add \$1 trillion to the GDP by 2025.

THE SKILLING MISSION

The Union budget last month saw the Modi government take the problem of skill development head-on. Union finance minister Nirmala Sitharaman announced the 'Prime Minister's Package' of five major employment-related schemes that had an ambitious Rs 2 lakh crore outlay spread over five years to facilitate jobs and skilling to 41 million youth. Of these, two big schemes focus on skilling, with the most ambitious one setting up internship opportunities in 500 top companies to 10 million youth over five years. Youth aged 21 to 24, who are neither employed nor in full-time education, can apply. The scheme includes a monthly internship allowance of Rs 5,000; the overall cost is Rs 63,000 crore over five years.

The other major initiative on skilling is the scheme to upgrade 1,000 Industrial Training Institutes (ITI) using a hub and spoke model and aligning their course content with industry needs to address the skill gap. The plan involves developing 200 hubs and 800 spoke ITIs, with a total investment of Rs 60,000 crore over five years. The central government will contribute Rs 30,000 crore, state governments Rs 20,000 crore, and the industry (including CSR funds) Rs 10,000 crore.

These and other initiatives promise to position India as a global leader in education, nurturing a generation equipped with the skills and knowledge to drive the nation's growth and innovation. ■

TAKEAWAYS

India has to achieve a high GER across school levels to become an exemplary education system

The NEP's new 5+3+3+4 model stresses experiential learning, critical thinking

NEP advocates transitioning to multi-disciplinary, research-focused institutions

A hands-on learning experience is crucial to address the skills gap in graduates



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Govt. of Bihar

RISING

AND RESURGENT

Under Chief Minister Nitish Kumar's leadership, the once-laggard state has undergone a transformative journey...



In contemporary India, the rise of regional parties has gained political and economic prominence. This shift is characterised by the mobilisation of ethnic and socio-economic identities with the state-level parties—particularly those focused on social justice and empowerment of marginalised communities—often outperforming national parties in state elections. State-level leadership has evolved from the era of one-party dominance to a more varied and region-focused landscape.

Bihar Chief Minister Nitish Kumar offers a deft balance of regional and national perspectives, with the state participating in the national development by adopting a multi-faceted and inclusive approach. He offers a compelling case study in effective political leadership and integrity and probity in public life. Unlike his predecessors, Kumar has prioritised quality governance over promotion of dynastic politics, family aggrandisement, and nepotism.

Nitish Kumar's leadership is characterised by a commitment to good governance and development, which contrasts sharply with the patronage-based politics of the past. Under him, Bihar has seen substantial improvements on the fronts of employment, women's welfare, infrastructure, healthcare, agriculture and other sectors. His leadership has

contributed to a significant turnaround in the state's image, transforming it from a symbol of poverty, backwardness and lawlessness to an outstanding example of fair, non-discriminatory rule with a progressive, modern approach, upholding minimum government and maximum governance.

Since assuming office in 2005, Nitish Kumar's tenure as the Chief Minister of Bihar has been marked by significant efforts towards the state's development. One of the hallmarks of his governance has been the improvement in law and order, which was a major issue in Bihar. This has led to a more stable and secure environment, promoting business and investment. His government has focused on several key areas. Here is a look at some of the initiatives and

Since assuming office in 2005, Nitish Kumar's tenure as the Chief Minister of Bihar has been marked by significant efforts towards the state's development. One of the hallmarks of his governance has been the improvement in law and order, which was a major issue in Bihar.



achievements of the Nitish Kumar government, reflecting on its performance and the impact on Bihar's socio-economic landscape:

EMPLOYMENT GENERATION: A MISSION MODE OPERATION

Recognising the critical need for jobs in a state with a burgeoning young population, the government has set ambitious targets under the "Seven Resolves 2" (Saat Nischay 2) initiative. Under this initiative, the government aimed to provide 10 lakh government jobs and create an additional 10 lakh employment opportunities during 2020-2025. Remarkably, the government has already surpassed the initial goal in employment creation, having provided over 22 lakh employment opportunities and upgraded the initial aim to provide 10 lakh government jobs to

12 lakh jobs till 2025. Specifically, between 2005 and 2020, the government facilitated 8 lakh government jobs. Post-2020, this momentum accelerated with 5.16 lakh jobs already provided, 1.99 lakh appointments in the final stages, and plans for 5.17 lakh more appointments underway. This achievement demonstrates the government's commitment to job creation and the seamless execution of employment-oriented policies.

A significant portion of these jobs has been in the education sector. In a historic move, the government recruited 1,20,336 teachers in a single advertisement, including 70,545 primary teachers, 26,089 secondary teachers, and 23,702 higher secondary teachers. This initiative not only addressed the employment crisis but also aimed to enhance the quality of education in the state. Pertinently, the recruitment included 14,000 teachers from other states, underscoring Bihar's commitment to meritocracy and inclusive growth.

In an innovative approach to promote sports and recognise athletic talent, the government

Post-2020, this momentum accelerated with 5.16 lakh jobs already provided, 1.99 lakh appointments in the final stages, and plans for 5.17 lakh more appointments underway. This achievement demonstrates the government's commitment to job creation and the seamless execution of employment-oriented policies.



The government's commitment to women's empowerment extends to law enforcement. In 2013, a 35 per cent reservation for women was implemented in police recruitment, significantly increasing the number of female officers.



FOCUS
BIHAR

introduced the "Medal Lao Naukri Pao" scheme. Under the "The Bihar Outstanding Sportspersons Direct Appointment Rules-2023," athletes who win medals in national and international competitions are directly recruited into government jobs, with positions ranging from Sub-Divisional Officer (SDO) to Deputy Superintendent of Police (Dy. SP). So far, 342 athletes have benefitted from this scheme, highlighting the government's dedication to encouraging sports among the youth.

WOMEN'S EMPOWERMENT: BREAKING BARRIERS

Nitish Kumar's administration has made significant strides in women's empowerment, including reservations for women in local bodies and jobs. In 2006, the government introduced 50 per cent reservation for women in Panchayati Raj Institutions. It was further extended to urban local bodies as well in 2007, setting a precedent for increased female participation in decision-making at grass-roots level. This move empowered women to step out of traditional roles and take up leadership positions in governance. Also, in education sector recruitment, 48 per cent of the selected teachers

were women, further promoting gender equality. The government's commitment to women's empowerment extends to law enforcement. In 2013, a 35 per cent reservation for women was implemented in police recruitment, significantly increasing the number of female officers. Today, Bihar boasts over 29,000 women in its police force, the highest in India, with women constituting 29 per cent of the force compared to the national average of 16.05 per cent. This substantial increase has made Bihar a model for gender inclusivity in law enforcement.

Recognising the importance of education, the government launched the "Mukhyamantri Balika Cycle Yojana" in 2006, providing financial assistance to girls for purchasing bicycles to commute to school. This initiative, along with the "Mukhyamantri Poshak Yojana" significantly encouraged girls' education, increasing female school enrolment and attendance. Furthering this effort, the "Mukhyamantri Kanya Utthan Yojana" was introduced, offering financial incentives for girls to complete their graduation. These initiatives have collectively contributed to an appreciable decline in Bihar's fertility rate from 4.3 to 2.9,

considerably aiding in population control.

To promote entrepreneurship among women, the government launched the “Mukhyamantri Mahila Udyami Yojana” providing financial assistance up to Rs.10 lakh, of which Rs.5 lakh is a grant and the remaining Rs.5 lakh is an interest-free loan repayable over seven years. The “Hunar” programme offers vocational training to women from minority groups in 20 different trades, along with tool-kits to start their businesses under the “Auzar” scheme.

Bihar government’s ambitious project ‘Jeevika’ has made remarkable strides in women’s empowerment, with over 10.47 lakh self-help groups established to date. These groups have mobilized more than 1.30 crore women, who have become Jeevika Didis, driving positive change in their communities, and becoming self-sufficient in the process.

Jeevika’s impactful self-help group model is now being replicated in urban areas, where women will come together to form supportive communities. This expansion marks a significant milestone in Jeevika’s journey, as it continues to break down geographical barriers and empower women across the state.

**INFRASTRUCTURE DEVELOPMENT:
BUILDING THE BACKBONE OF PROGRESS**

Infrastructure development has been a cornerstone of the Nitish Kumar government, with a focus on improving road connectivity and transportation. Under his leadership, Bihar has

The government has laid down extensive road infrastructure, connecting even the most remote villages to urban centres. This connectivity has facilitated not only the movement of people but also boosted economic activities by making markets more accessible to rural farmers and artisans.



seen substantial improvements in road infrastructure and electrification, contributing to better connectivity and easier movement of people and goods.

Since 2005, Bihar has seen a transformative expansion in its road network. The government has laid down extensive road infrastructure, connecting even the most remote villages to urban centres. This connectivity has facilitated not only the movement of people but also

boosted economic activities by making markets more accessible to rural farmers and artisans.

The state government has upgraded all state highways to at least two-lane roads with paved shoulders and improved major district roads. Significant investments have been made in constructing new bridges and flyovers over major rivers like the Ganga, Kosi, Gandak, and Sone to ensure seamless transportation across the state. Key projects include the construction of a 6-lane cable-stayed bridge between Kacchi Dargah and Bidupur, a 4-lane bridge between Bakhtiyarpur and Tajpur, 20.5 Km long J.P. Ganga Path and a parallel 6-lane bridge to the existing Vikramshila Setu. These projects are part of a broader vision to ensure that no part of Bihar is more than five hours away from the state capital, Patna.

**GOOD PRACTICES AND SOCIAL WELFARE:
INCREASING HAPPINESS QUOTIENT**

The Nitish Kumar government has implemented several governance reforms aimed at improving

Under the “Har Ghar Nal Ka Jal” scheme, the government has ensured piped water supply to every household, significantly improving the quality of life in rural areas. The “Lohia Swachh Bihar Abhiyan” has focused on constructing toilets and promoting sanitation, contributing to the state’s improved health outcomes.



administrative efficiency and transparency. The introduction of the Bihar Right to Public Services Act in 2011 and Bihar Public Grievance Redressal act in 2015 was a significant step towards ensuring timely delivery of services to citizens. These acts guarantee the delivery of public services within a stipulated time frame and have empowered citizens to hold the administration accountable. So far, 10.48 crore services have been provided under Bihar Right to Public Service Act-2011 while 15.78 lakh cases have been disposed under Bihar Right to Public Grievance Redressal Act.

To streamline administrative processes and enhance transparency, the government has adopted various e-governance initiatives. Online portals for various services, digital record-keeping, and electronic grievance redressal systems have been put in place, making the government more accessible and responsive to the public.

The state government has made notable strides in improving healthcare infrastructure and services. Initiatives like the “Mukhyamantri Chikitsa Sahayta Yojana” and the expansion of primary healthcare centres have improved access to medical services in rural areas. Additionally, the focus on maternal and child health has led to a reduction in infant and maternal mortality rates.

Under the “Har Ghar Nal Ka Jal” scheme, the government has ensured piped water supply to every household, significantly improving the quality of life in rural areas. The “Lohia Swachh Bihar Abhiyan” has focused on constructing toilets and promoting sanitation, contributing to the state’s improved health outcomes.

Under Nitish Kumar, Bihar has experienced significant economic growth, surpassing the national average in recent years. The contrast with the previous era, marked by stagnation and mismanagement, underscores the impact of

Kumar’s leadership on Bihar’s development. He has prioritised social welfare and inclusive development, ensuring that the benefits of growth reach all sections of society. His government has implemented various social welfare programs targeting marginalised communities.

**ACCELERATING INDUSTRIAL
DEVELOPMENT: PROVIDING THE RIGHT
POLICY BOOST**

Bihar has recently emerged as a hotspot for the development of small and medium industries, tapping into its immense potential for employment generation. Under the Mukhyamantri Udyami Yojana, implemented by the Department of Industries, the government disbursed Rs.2607 crore to 40,049 entrepreneurs by July 31, 2024, aiding the establishment of start-ups and small-scale industries. Under the Bihar Laghu Udyami yojana government has disbursed- Rs.200.50 crore (1st installment) to 40099 Beneficiaries.

The Bihar Industrial Area Development Authority (BIADA) is responsible for managing land availability for new industrial establishments, currently overseeing 78 industrial areas, zones, development centers, and mega industrial parks. In the fiscal year 2023-24, BIADA expanded its purview with the notification of eight new industrial areas.

To enhance infrastructure and facilitate industrial growth, BIADA is investing Rs.1780.7 crore in the development of plug-and-play Sheds across various industrial areas. This initiative encompasses the construction of essential amenities, including roads, boundary walls, solar streetlights, sewerage systems, Food Parks, and ancillary infrastructure. Spanning 13 industrial





The Bihar Industrial Investment Promotion Policy, 2016, is instrumental in promoting industry in the state. It offers various incentives, including interest refunds on loans, 100 per cent refunds on electricity duty, stamp duty, registration fees, and land conversion fees, and grants for employee training.



areas across nine districts, the project covers approximately 24 lakh square feet.

Notably, several plug-and-play sheds have been completed in Muzaffarpur and Bihta, with allotments made to prominent textile and garment manufacturing companies. This has generated an investment of Rs.555 crore in the textile and leather sector.

A notable success story is the Muzaffarpur Bag Cluster, where 44 industrial units are operational, 42 of which are run by beneficiaries of the Mukhyamantri Mahila Udyami Yojana. This initiative created sustainable employment by leveraging the skills of skilled workers and attracting Mumbai-based anchor units to set up operations in Bihar.

The Bihar Industrial Investment Promotion Policy, 2016, is instrumental in promoting industry in the state. It offers various incentives, including interest reimbursement on loans, 100 per cent reimbursement on electricity duty, stamp duty, registration fees, and land conversion fees, and grants for employee

training. As of January 31, 2024, 2855 units have been sanctioned under this policy, with capital projects worth Rs.69,517 crore. In the current financial year, 481 applications worth 4512.85 crore were approved, with financial incentives totalling Rs.2195.10 crore for 175 commissioned installations, generating employment for 8085 people.

The Bihar Industrial Investment Promotion Policy (Textile and Leather), 2022, extended until June 30, 2024, aims to promote textile, garment, silk, electro-charkha, leather, footwear, and allied industries. This policy offers necessary support to investors, creating new investment opportunities and attracting both domestic and foreign investment.

Under Chief Minister Nitish Kumar's leadership, Bihar has made significant strides in industrial development. Strategic initiatives have unlocked the state's potential, creating a thriving entrepreneurial ecosystem. Focused policies, infrastructure investments, and support for local entrepreneurs have driven economic growth and job creation, marking a milestone in Bihar's

journey towards sustainable development and self-reliance.

HARNESSING YOUTH POWER: MAKING YOUTH INDUSTRY-READY

The Bihar government is launching a major initiative to train the state's youth to meet industry standards. Under the "Yuva Shakti - Bihar Ki Pragati" initiative within the Seven Resolves-2 framework, the government plans to upgrade the quality of educational institutions. Every Industrial Training Institute (ITI) and polytechnic in the state is being developed into a Centre of Excellence (CoE), offering top-tier employment opportunities for trained individuals. Emphasis is being placed on new technologies and sectors with high market demand, with courses in Industry 4.0, graphic design, IoT (Internet of Things), and machine learning already being integrated into the curriculum.

The "Yuva Shakti - Bihar Ki Pragati" scheme is transforming all 149 ITIs in Bihar into CoEs in collaboration with Tata Technologies. This project, initiated in 2021, saw the signing of a Memorandum of Understanding between the Directorate of Employment and Training and Tata Technologies on January 31, 2022.

Tata Technologies and 20 other companies are working together to develop ITIs as global-standard skill training centres, providing training for students from other ITIs, polytechnics, and engineering colleges, and assisting thousands of students annually.

This project will equip Bihar's youth with knowledge of cutting-edge technologies. The

goal is for them to gain comprehensive insights into the latest techniques in the industrial sector. The CoEs will offer training in advanced robotics, battery electric vehicles, cutting-edge automobile technology, advanced machining, IoT design engineering, and additive manufacturing (3D printing). The Bihar government's training programme focuses on skills that are in high demand across industries.

The primary objective of this initiative is to establish high-quality skill training centres as global technology hubs. These CoEs will provide industry-focused training and education, creating a highly skilled workforce. The programme will tackle unemployment in phases, addressing the gap in courses that lead directly to employment. With new market demands, traditional courses are increasingly insufficient for securing job opportunities.

These CoEs will create a robust pipeline of skilled human resources, addressing skill gaps and playing a vital role in industry development. Companies will benefit from reduced training time and costs. The Bihar government's initiative represents a significant step forward in overcoming major industry challenges.

The total cost of the Bihar government's project is Rs.4606.97 crore. Of this, 12% (Rs.552.84 crore) will be funded by the state government, while 88% (Rs.4054.13 crore) will come from Tata Technologies and their partner companies.

Tata Technologies is responsible for procuring and installing tools and equipment for the CoEs. They will also appoint two industry experts at each ITI. This step will build a strong pipeline of skilled human resources, addressing skill shortages and contributing significantly to overall industry development.

The Nitish Kumar government has provided all necessary facilities for the project's smooth operation. Land for CoEs at ITIs will be allocated, with the centres being built in a grand and modern style to provide employment-



oriented training. The Bihar government will also ensure the necessary infrastructure.

The objective behind establishing the CoEs is now showing results statewide. Youth in Bihar are finding employment, with the project being implemented in collaboration with 20 prestigious companies. Specially developed 23 courses are being offered for training.

Currently, 2400 trainees are undergoing training in all 23 courses. In the academic year 2024-25, a total of 9600 trainees will be trained. So far, 2000 trainees have secured employment in leading Indian companies this academic year—a significant achievement.

Tata Technologies and the Labour Resources Department are working diligently to ensure that 60,000 trainees will receive training and employment by the academic year 2025-26. This will mark a major success for Bihar. The main goal of this initiative is to enhance the skills of Bihar's youth, empower them for employment, and advance the state towards industrialisation.

TAKEAWAYS

Under Nitish Kumar, Bihar has experienced significant economic growth, surpassing the national average in recent years. The contrast with the previous era, marked by stagnation and mismanagement, underscores the impact of Kumar's leadership on Bihar's development. He has prioritised social welfare and inclusive development, ensuring that the benefits of growth reach all sections of society.

The initiatives and policies implemented under Nitish Kumar's leadership have brought about positive changes in the state's socio-economic landscape. However, the journey towards comprehensive development is ongoing. Addressing economic disparities, curbing migration, and improving law and order are areas that require continued focus and effort. As Bihar moves forward, the lessons learned and the foundations laid during Nitish Kumar's tenure will play a crucial role in shaping the state's future trajectory.

Nitish Kumar's focus on governance and development, coupled with a departure from traditional patronage politics, represents a new model for state leadership. It exemplifies the potential of state-level leadership to drive substantial change. He has adeptly navigated Bihar's complex political landscape to maintain power and implement his governance agenda. Overall, Nitish Kumar's leadership model provides a valuable perspective on the intersection of politics, development, and governance.





By Pramath Raj Sinha

INDIA AS A GLOBAL STUDY CENTRE

Outdated curricula, inadequate infrastructure and ill-trained faculty have been the bane of Indian higher education. A structural overhaul, strict oversight and emphasis on digital education will raise standards to global levels

Big is not always beautiful. With over 58,000 institutions and 43 million students, India's higher education system is one of the biggest in the world. But the overall perception of our colleges and universities is poor and, indeed, our institutions are plagued by issues of low quality. Addressing these deficiencies requires a three-pronged approach focused on systemic change. Without this, India cannot become a global hub for higher education; we need to become high-quality locally to be perceived as an attractive centre internationally.

Currently, there is a huge disparity in the quality of education. While prestigious public institutions like the IITs and IIMs and private ones such as Ashoka University and ISB take pains to maintain high standards, most colleges and universities struggle with outdated curricula, inadequate infrastructure and ill-trained faculty. This uneven playing field not only leaves thousands of students poorly-educated and ill-prepared for the real world, it also perpetuates inequality in life.

To address this, India needs to introduce a credible and

reliable accreditation system that authentically evaluates higher education institutions. We need multiple independent organisations to strictly assess and benchmark the quality of our institutions. They should accurately measure and offer unbiased information about all aspects of the education being imparted at each institution. One, they should throw light on the quality of the faculty, the infrastructure and facilities, student outcomes as well as the overall campus experience. Two, they should highlight the differences between one institution and another. Most importantly, they should provide this information to students, parents and institutions in a transparent manner. Accreditation is a norm internationally and has led to the rise of first-class higher education systems in Europe, US and SE Asia. However, accreditation doesn't equal ranking.

A robust and trustworthy accreditation system helps students and parents to know exactly what to expect from which university, down to career prospects. Two, organisations striving to achieve or maintain accreditation status get motivated to adopt best practices, invest in their faculty and enhance

student support services. They develop a competitive spirit that, in turn, can lead to a much-improved higher education environment across India. Three, improving the overall quality of our universities enhances their global standing and makes them more attractive to international students and faculty.

We also urgently need to increase and improve student access to quality education. A large number of young people in our country need to be educated. But the old model of building more classrooms and finding more teachers to teach more students doesn't work. Stated GER (gross enrolment ratio) targets will require India to double the number of universities and colleges in the next 10 years. It is physically impossible to build that many campuses or find those many talented teachers.

World's best digital university: Therefore, we must rely on technology to increase access. So far, digital delivery is a low-quality replication of the offline model. Swayam, the government portal, offers free educational courses, but only four per cent of students who enrol in its courses are reported to successfully complete them. What India needs is a top-notch online education model that has been designed for India and works at scale. We have not just the opportunity but also the talent to build the world's best digital university. The government had talked about such a university while presenting the Union budget in 2022. It's an idea whose time has come.

My last point is linked to improving the lot and life of our students. While I don't have a silver-bullet solution to offer, we definitely need to reduce our dependence on entrance examinations for everything, from engineering to medicine to law to humanities. These exams may have been started with the best of intentions, but the high stakes have ended up causing stress and anxiety and forcing students into rote learning.

We are essentially equating education with entrance examinations and, in the process, damaging generations of young people. Because all they are doing is sweating in coaching classes for tests that they see as a pathway to a high-quality institution and, eventually, the career of their dreams.

The pressure doesn't ease when students get into college, because then they start preparing for CAT or other post-graduate entrance exams. Entrance tests are creating massive distortions as learners are not getting to experience, leave alone enjoy, the full school and college experience. They have no time to develop creativity or critical thinking skills; they're too busy cramming. We need to rejig this system before it's too late.

More can be done to improve our educational system. But by implementing the changes mentioned here, India can make a start on elevating its higher education system and ensuring that its institutions produce graduates who are well-prepared for the demands of the modern world. Only then can we become a global hub for higher education. ■

The author is Founder and Chairman, Harappa Education and Ashoka University

THE GIANT STEPS

- ▶ **India needs to introduce a credible accreditation system to authentically evaluate higher education institutions**
- ▶ **Increasing and improving student access to quality education is crucial. A top-notch online education model that has been designed for India and works at scale is the answer**
- ▶ **Entrance tests and coaching centres stop learners from developing their creativity or their critical thinking skills**
- ▶ **To improve the lot of students, India needs to reduce its dependence on entrance examinations for all disciplines**



By Rukmini Banerji



CRAFTING SCHOOLS OF THE FUTURE

Schools are still chained to textbook content and are more about ensuring teaching. As outlined by the National Education Policy 2020, they need to be freer, liberal learning spaces that can prepare students for work and life

Sometimes in the month of August, even during heavy rains, there are days when the sky is bright blue and the sun shines brightly on the treetops. On such days, it almost feels that you can see till far, far away. Today is a day like that. Let us gaze into the distance and in our mind's eye, imagine what a school can be like in the future.

Building foundations: The school for small children has four rooms built around a big internal courtyard. Each of these rooms has doors that connect into their neighbouring rooms. Wide verandas wrap around the school building on the outside. The rooms are brightly painted; children's work decorates the walls. Shelves with colourful books and interesting toys and materials invite one to touch, smell, see and use. Although this is a school exclusively for children between the ages of four and eight, families are welcome. Young parents, siblings and grandparents love coming to school and spending time with their children and others. For building strong foundations for learning, young children must be exposed to varieties of activities across domains. The aim in the foundation stage is to encourage children to explore and to acquire a breadth of skills that enable them to investigate the world around them. This phase of a child's life should be seen as a continuum and stage rather than a series of age-grade classes.

Let us walk through our foundation school. Right now, it is the time for cognitive activities. In every room, children are absorbed and busy. Activities range from easy tasks like arranging sticks in order of size or separating potatoes from the onions—to harder activities like puzzles. Teachers gently encourage each child to try different activities, nudging some towards more challenging ones. The rooms are available to all. Children seem to settle in the room where the set of activities

are best suited to them. The experience is one of active progression through a continuum. For parents, their enthusiastic engagement with their children's learning is fuelled by the fact that when they were in grade 1 or 2, schools were much more academic and structured. They are fascinated to see how children are developing confidence and skills in this happy space.

Connecting to the world around: Not far from this is another building for children who are anywhere between 10 and 15 years old. Here, children spend as much time outside in the community as they do in the classroom. Their activities are done in small groups of four or five. Today, they are busy with "water". Rainfall has to be measured and charted on a daily basis. Groundwater sources have to be mapped; canals, streams, ponds, rivers, streams have to be tracked. The children are building a water history for their neighbourhood. The older people in their families and communities are amused by the detailed questions that the teenagers ask about rainfall, irrigation, floods and droughts. Teachers are relishing taking ownership of linking children to their immediate context. In earlier times, textbook content was all that mattered. It used to be more about ensuring teaching than supporting learning. But now there are so many more opportunities to move beyond theories and meaningfully connect to live phenomena. No longer is it necessary to compartmentalise topics within subject boundaries. It is perfectly fine to think about evaporation and condensation and also sing songs about rain, enjoy poems about monsoons. Each group of children carefully documents what they are finding and are uploading it to their district water portal—each school playing a major part in contributing to understanding ecological and social changes happening near them.



THE GIANT STEPS

- Young children will be exposed to a variety of activities, encouraged to explore the world around them
- In middle school, they would spend as much time outside class as in it, probe their immediate context, contribute to knowledge
- A student can take up basic courses in many subjects or go deeper and higher in a few
- After 16, students will be connected to a local establishment. They will have Anytime Testing Machines (ATMs) to test themselves in any subject of their choice

Choosing the path forward: As soon as the student is 16, she or he has to be connected to an enterprise and establishment nearby. For two years, young people participate for some hours a day in the world of work. Some employers actively seek apprentices. Some young people take initiative to find work that is of their interest. For others, it is still an uphill challenge. But it is now widely accepted that local economies must contribute to and gain from their young people's effort and learning.

Of course, they still are schools. But, these are not organised by grades; instead, they are set up as subject areas. A student can either take basic "courses" in many subjects or go deeper into a few. No longer do students have to wait for a whole year to move into a new class. No more are they tense about year-end examinations that will decide the course of their lives. Best of all, today any

student can go to an 'ATM'—anytime testing machine—and test themselves in any subject at the level that they choose. Thanks to adaptive technologies, you can take tests as many times as you want and your best score will be recorded. Along with the testimonials from their work, their ATM test scores accumulate over time. Armed with these experiences from their high school years, young people can go forth into the world.

How far away are we from these schools of the future? The National Education Policy 2020 has outlined many of these transformative pathways. How quickly can we change our school systems and revise our family aspirations to support new and more meaningful ways for our children to learn for school, learn for life and learn for work? ■

The author is CEO, Pratham Education Foundation



OUR NEW TRYST WITH DESTINY

India must complement its great democratic processes and political independence with economic freedom. Ending employed poverty needs innovating at the intersection of jobs and skills education

India's twin challenges of politics and economics involved two risky experiments in 1947. The political one—votes for everyone—has worked out spectacularly, with India creating the world's largest democracy on the infertile soil of the world's most hierarchical society. But the economic one—embodied in the Avadi resolution of 1955 where the Congress session adopted a socialist economic path—failed spectacularly because it sabotaged mass prosperity by confiscating the entrepreneurial freedom to create jobs. Consequently, our labour is handicapped without capital and our capital is handicapped without labour. Our unfinished journey from national independence to mass prosperity requires policy innovation at the intersection of jobs and skills. The recent budget has made a great start, but reforms must accelerate.

The Hitopadesha suggestion *vidya dadati vinayam* (knowledge brings humility) was ignored by knowledgeable romantics, elitists, welfarists, bureaucrats, educationists and trade unionists. Romantics unfairly view private employers as perpetual entities like the government. Elitists think private sector salaries are paid by shareholders rather than customers. Welfarists believe private employment can be substituted by government spending financed by debt. Bureaucrats think statutory employer benefits are financed outside salaries rather than from them. Educationists looked down at skills. And trade unionists believe job preservation is a form of job creation. All six worldviews suffer from inattention to detail; a bird's rather than a worm's eye view of the daily life of investors, employers, employees and job-seekers.

The following reforms need to be carried out to remedy the situation.

Jan Vishwas 2.0: The Jan Vishwas Bill removed excessive jail provisions vis-a-vis employer compliances last year by recognising that criminalisation of civil offences hurts small

employers, enables corruption and rewards informality. It was a small start—only 113 jail provisions for employers from over 25,000 were removed—and we must now undertake Jan Vishwas 2.0 to eliminate hundreds of needless jail provisions.

Fixing government schools: Smaller class sizes, regular/adequate teacher salaries and better teacher qualifications have not delivered learning outcomes because they were necessary, but not sufficient. We must urgently fix governance (allocation of decision rights) and performance management (a fear of falling and hope of rising) because government schools are the first rung in the ladder of opportunity.

Reimagining skill development: The challenge of scaling

THE GIANT STEPS

➤ **Government schools must be fixed urgently and implementation of the National Education Policy 2020 accelerated**

➤ **The challenge of scaling skill development programmes has shifted from curriculum and delivery to financing**

➤ **The five design principles that attract new financing are—learning by doing, learning while earning, learning with qualification modularity, learning with flexible delivery, learning with signalling value**

➤ **To accelerate job creation, there must be a Jan Vishwas Bill 2.0 to eliminate hundreds of needless jail provisions for employers**

INDIAN MARKET IS IMPORTANT DUE TO THE GLOBAL DEMAND FOR INDIAN TALENT: WES

World Education Services (WES) is a non-profit social enterprise dedicated to helping international students, immigrants, and refugees achieve their educational and career goals in the U.S., Canada and beyond. Since 1974, WES has provided credential evaluations to over four million individuals from more than 200 countries. With the ever-increasing globalization of education and work, it has become imperative to understand and recognize qualifications and credentials.

Ms. Esther T. Benjamin, CEO and Executive Director, World Education Services shares her views with India Today during her visit to New Delhi.



Ms. Esther T. Benjamin
CEO and Executive Director
World Education Services

■ Please share an overview of WES and what exactly is credential evaluation?

World Education Services, commonly known as WES, is a 50-year-old global organization dedicated to the success of international students and immigrants from all over the world. We evaluate academic qualifications from around the globe.

A credential evaluation is a report that compares educational qualifications earned in one country to those in another. People use it to gain recognition for their academic achievements when applying for jobs, further education, or professional licensure.

First, we authenticate and verify the qualification to ensure that the individual has indeed earned the degree. We confirm that the qualification is from a recognized institution and that the degree is accredited in the country where they studied. The second part of our work is what we refer to as equivalency. This involves comparing education from one country to education in the United States or Canada.

So, an academic evaluation or credential evaluation ensures that a qualification from one part of the world is understood and recognized in another geography.

■ What is the USP of WES and the reasons for its global success?

We have a very talented team of over 350 people located across Canada and the U.S. Many of them have been international students and immigrants themselves and bring both lived experience and deep subject matter expertise to our work. Additionally, the data and knowledge we have

accumulated from our work is significant. Our methodology is proven, rigorous, and reliable – an industry 'gold standard.'

We are tech-savvy, enterprising and constantly evolving, always bold and ambitious about serving our customers and staying focused on impact. And as a non-profit social enterprise, all our revenue is re-invested in the people we serve.

■ Can you share some of the emerging global trends in Education that you think will have a significant impact on the landscape?

1. Internationalization of Education:

This trend involves the increasing mobility of students studying outside of their home country and the growing number of partnerships between universities worldwide. We are seeing a rise in dual degree programs, twinning agreements, and faculty exchanges.

2. Online and Hybrid Education:

The transition from traditional distance education to more flexible online and hybrid learning models has accelerated, particularly due to the pandemic. Students now seek more options in how and when they study, including a mix of in-person and online classes.

3. Comprehensive Learning Pathways:

Education is no longer limited to traditional academic degrees. Today, it encompasses vocational training, micro-credentials, professional licenses, and practical experience like internships.

■ How big is the India market for you, and what are the challenges and opportunities that you are identifying here?

The Indian market is incredibly important due to the global demand for Indian talent. The numbers speak for themselves—about 30% to 35% of the people we serve annually at WES are Indian graduates. Generally speaking, around 150,000 Indian individuals bring us well over 200,000 academic qualifications to evaluate each year.

Understanding India is crucial for us, including its education system and the aspirations of its young people and professionals.

Interestingly, we can rank institutions worldwide based on graduate mobility. WES data provides insights into the institutions from which the largest numbers of graduates are pursuing opportunities abroad. In the Indian landscape, the top five institutions for WES are Punjab University, University of Mumbai, Anna University, Gujarat Technical University, and JNTU Hyderabad. The ranking can vary slightly from year to year, but these five consistently form the top institutions for which we do academic evaluations.

■ How do you envision the next 50 years for WES?

The next 50 years for WES will be about continuous evolution and innovation in service of our mission. We need to stay attuned to the changing landscape and be ready to develop new solutions to address new challenges that individuals may face.

It is about maintaining a relentless drive to be bold and ambitious and drive impact to help others achieve their dreams and realize their full potential.



skill development programmes has shifted from curriculum and delivery to financing. Over the last decade, we have learnt five design principles that attract new financing—learning by doing, learning while earning, learning with qualification modularity, learning with flexible delivery and learning with signalling value. The central government is important, but state governments must take the lead in innovation.

Create a national open compliance grid: India's revolution in payments, identity and vaccination certificates enabled by DPI (Digital Public Infrastructure) has not been replicated in government plumbing. We must replicate this open and stacked architecture by creating a non-profit national compliance corporation that will use a unique enterprise number to house the API/ interface layer for all employer filings, compliance and workflows and enable private sector innovation in straight-through processing for employers.

One labour code: It is impossible for employers to comply with all of India's labour laws without violating some of them. Increasing our manufacturing jobs needs a single labour code as a powerful signal of our policy intent to protect employees while creating more formal employers.

NEP acceleration: India's many education policy documents—the 1948 Radhakrishnan report, the 1968 Kothari Committee report and the 1986 National Education policy—were useful but incomplete. NEP 2020 finally gives us a roadmap that breaks down the barriers between education and employability, pushes holistic learning, grants *poorna swaraj* (complete independence) to universities, expands apprenticeships, and much else. Unfortunately, the NEP's glide path for implementation was 15 years for consensus-building. But the world of work and education are changing fast and we should bring down the implementation of this roadmap to five years.

The Chinese Communist party's third plenum recently decided to seek "high quality" rather than "high speed" growth. China's reliance on high debt, high leverage and enormous levels of fixed investment in infrastructure has banged into natural limits unfamiliar to democracies like India. India may not have mass prosperity but we have impressive islands of excellence—exporting more software than Saudi Arabia did oil in 2021, getting \$120 billion in remittances from 17 million Indians overseas and being the world's pharmacy. The arrogance of the Avadi Resolution of 1955 sabotaged mass prosperity. Righting this wrong—our new tryst with destiny—is complementing our political independence with economic freedom. ■

The author is Co-founder, Teamlease Services



NEED FOR A QUANTUM LEAP



Photograph by
MANDAR DEODHAR

FUTURE CALLING
The Quantum Measurement
and Control Laboratory at
TIFR, Mumbai

SPEEDING ON THE DIGITAL FREEWAY

Be it quantum computing or AI, Indian govt and private players are taking up the development of new-age tech on mission mode. There can't be any let-up now

By **Ajay Sukumaran**

At the Tata Institute of Fundamental Research (TIFR) in Mumbai, work to build India's first quantum computer is nearing completion. When ready, this small-scale quantum computer will be a significant milestone for TIFR's Quantum Measurement and Control (QuMaC) lab, established 12 years ago to address fundamental challenges in building quantum systems. Dr R. Vijayaraghavan, who heads QuMaC, sees the project as a crucial first step for India that will "allow us to get into this game". The project they are working on, in collaboration with the Defence Research and Development Organisation (DRDO) and Tata Consultancy Services (TCS), involves designing key components, such as the quantum processing unit, electronics and software—each of which presents multiple levels of complexity.

A quantum bit or qubit is the basic unit of a quantum computing system. Think of it as the equivalent of bits, building blocks of the conventional computers. But while a bit exists in binaries (of either 0 or 1), a qubit can hold both values at the same time. This ability to be in multiple states simultaneously is known as superposition, which means a quantum computer can theoretically tackle far more complex calculations than even the most powerful supercomputer today. For example, it could easily break all the secure algorithmic codes that we rely on today for banking transactions, military communication etc. Or take the case of drug discovery, where there's a need to simulate molecules in various states, or supply-chain logistics, where the goal is to arrive at the most optimal procedure—quantum comput-

ers could offer a disruptive advantage in carrying out all such functions. That's the reason quantum computing, along with Artificial Intelligence (AI), features on the list of 'critical' technologies on the national agendas of most countries. Globally, funding announcements into quantum technologies by various governments over the years touched \$42 billion (Rs 3.5 lakh crore, at the current exchange rate) in 2023, according to McKinsey's Quantum Technology Monitor published in April this year. India, too, announced a National Quantum Mission in April 2023, for which Rs 6,000 crore has been earmarked up to 2030-31. "Quantum technology is the new technology frontier, reached after decades of fundamental research," said Professor Ajay Kumar Sood, principal scientific advisor to the Government of India, in a release issued on April 14, celebrated as World Quantum Day.

THE FIRST STEP

For QuMaC and their collaborators, the small-scale quantum computer is a technology demonstration. Whatever equations it can solve can be "perfectly mimicked" by a laptop, says Vijayaraghavan. "But if we have to build a 100-qubit system, we have to start somewhere. So, this gives us all the necessary expertise in understanding the different parts of a quantum computer and where the challenges are." He points to how IBM, about eight years ago, launched its first 5-qubit quantum computer on the cloud. "For us," he adds, "it's the first step." As part of the National Quantum Mission, Vijayaraghavan leads a team of eight scientists from across five institutes which is putting together a proposal to build a 24-qubit computer in three years and a 100-qubit computer in five years. Likewise, there are other teams of specialists working on different proposals—these include various technological approaches to building quantum systems using photons, neutral atoms or trapped ions as qubits.

However, scientific challenges abound because qubits are also unstable and vulnerable to the slightest disturbance. Globally, the challenge before researchers is to find ways around this 'decoherence' via error-corrected qubits. "You have to show that by using such a system, you are actually solving some problem which is of relevance to industry or science or society and show that it is better, faster and cheaper," says Vijayaraghavan. "That of course will be the first holy grail of useful quantum computers. We are not there yet."

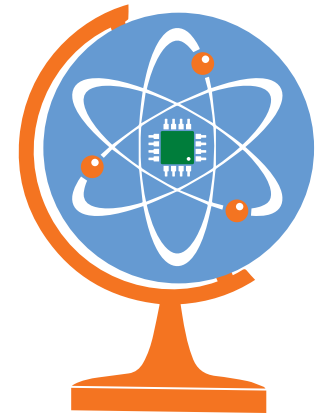
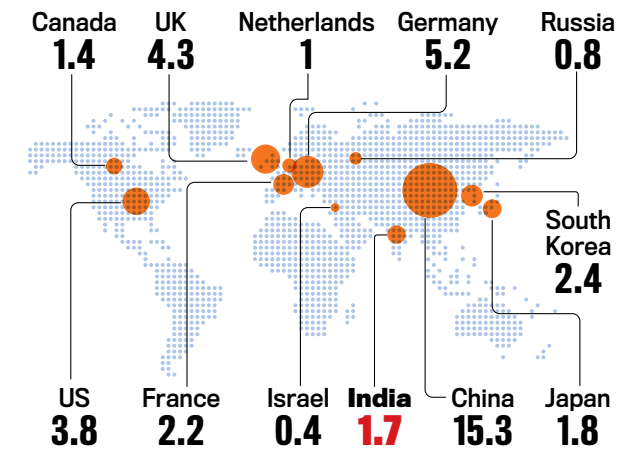
THE HI-TECH IMPERATIVES

It all boils down to identifying and investing in promising opportunities in emerging technologies and creating a favourable ecosystem for private players to pitch in too

FUNDING BOOST

While China leads the pack in global public investments in quantum technology, India too is playing catch-up with at least the West

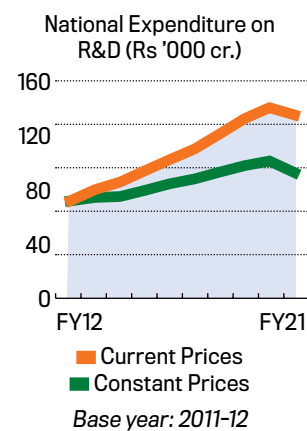
Note: The figures denote investments (in \$ billion) announced by respective governments, as of 2023
Source: Quantum Technology Monitor, McKinsey & Co, April 2024



RENEWED FOCUS ON R&D

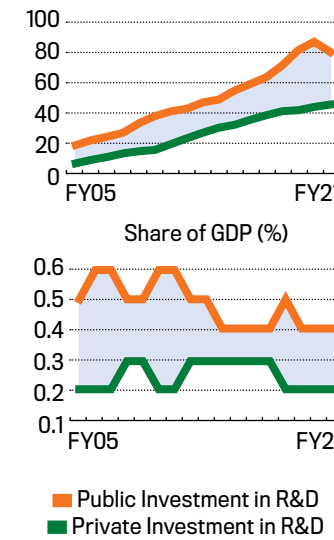
NATIONAL EXPENDITURE

India's spending on R&D saw a consistent rise. A dip in FY21 can be attributed to the Covid lockdowns



PUBLIC VS PRIVATE

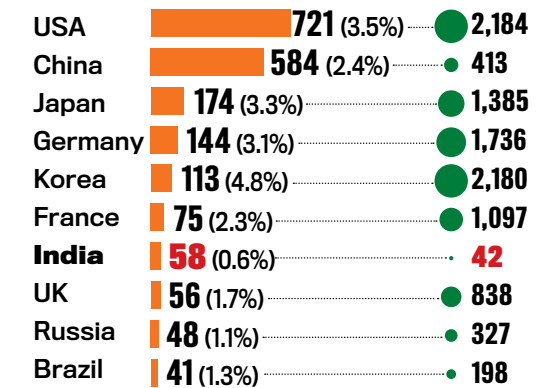
Investment (Rs '000 cr.)



WHERE INDIA STANDS IN GLOBAL R&D SPENDING

India's R&D expenditure may be just 0.6% of its GDP, but it's ahead of other major economies like the UK, Russia and Brazil in volume

■ R&D expenditure, 2020 (in bn current PPP\$); as % of GDP in () ● Per capita (in current PPP\$)



Source: Department of Science and Technology; R&D Statistics, 2022-23

UNLIKE COMPUTER CHIP MANUFACTURING, THERE ARE HARDLY ANY COMMERCIAL FABRICATION FACILITIES FOR QUANTUM PROCESSORS GLOBALLY. IT'S AN OPPORTUNE TIME FOR INDIA TO START PLANNING FOR INVESTMENTS ON THAT FRONT

There are others wanting a piece of the action. On the first floor of a business park tower in Nagavara, Bengaluru, Dr Nagendra Nagaraja, CEO and chairman of a startup called QpiAI, has earmarked a corner of his office space for a lab in which an imported dilution refrigerator is due to be installed by September. Having raised \$6 million (Rs 50 crore) in funding, Nagaraja is building a 25-qubit quantum computer that he plans to unveil by the end of this year, for which the cryogenic refrigerator is a key component. Once the machine is ready, QpiAI plans to offer the platform to customers via cloud while also exploring a business model of supplying such systems to top institutes and research groups in India. "Our vision is to integrate AI and quantum computing in enterprises," he says, adding that there is an opportunity for Indian companies to be competitive on the world stage. "The more companies you have in advanced technology, the wealthier a nation. It's as simple as that."

In quantum technologies, especially, there's a real opportunity, given that it is still a nascent field globally. This is also where India's Rs 6,000 crore mission assumes significance. The outlay is big, when seen in the historical context of R&D funding in India. But the quantum technology field itself is vast, which means that the funds cannot be spread too thin.

THE AI AND SEMICONDUCTOR CHALLENGE

Meanwhile, the Union cabinet in March this year approved a Rs 10,372 crore mission to strengthen the AI ecosystem in the country. The modalities of the IndiaAI Mission are expected to be announced in a few months. Its objectives include democratising access to computing resources, enhancing data quality, nurturing homegrown AI expertise and promoting socially impactful AI projects. In July, speaking at the Global IndiaAI Summit 2024, Union minister of electronics & information technology Ashwini Vaishnav said that the government plans to acquire 10,000 graphics processing units (GPUs) as part of the AI mission. "Here, the government will be investing in creating a public platform where compute power, high quality data sets, a common set of protocols, a common framework, technical as well as legal, is available," said Vaishnav, adding that startups and academicians working on applications for a variety of sectors such as agriculture, medicine, healthcare and education can use this common platform to accelerate their efforts.

In semiconductor manufacturing, India was late to the game even though the country is home to 20-25 per cent of the world's computer chip designers. In a bid to kickstart a manufacturing ecosystem of semiconductors and LCD displays and "de-risk" the country from its dependence on imports, the government, in 2022, had announced a production-linked incentive (PLI) scheme with an outlay of Rs 76,000 crore. In February this year, Tata Electronics announced that it had received government approval to

TAKEAWAYS

- ▶ **India has a real opportunity in quantum technologies, given that it is still a nascent field globally. This is where the Rs 6,000 crore National Quantum Mission assumes significance**
- ▶ **The Rs 10,372 crore IndiaAI Mission aims to democratise access to computing**
- resources, enhance data quality, nurture homegrown AI expertise and promote socially impactful AI projects**
- ▶ **In semiconductor manufacturing, India was late to the game, but the size of the domestic market is expected to reach \$109 billion (Rs 9.15 lakh crore) by 2030**

build a mega semiconductor fabrication facility, or fab, in Dholera, Gujarat, in partnership with Taiwan's Powerchip Semiconductor Manufacturing Corporation (PSMC). The fab, into which a total investment of Rs 91,000 crore has been announced, will have a manufacturing capacity of up to 50,000 wafers per month and will generate over 20,000 direct and indirect skilled jobs.

The size of the Indian semiconductor market is expected to reach \$109 billion (Rs 9.15 lakh crore) by 2030 from \$38 billion (Rs 3.2 lakh crore) in 2023, minister of state for electronics & information technology Jitin Prasada told the Lok Sabha on July 31. The global semiconductor industry is expected to grow to \$1 trillion (Rs 83.95 lakh crore) by 2030.

Unlike computer chip manufacturing, there are hardly any commercial fabrication facilities for quantum processors globally, which means it's an opportune time for India to start planning for investments on that front. The four industries likely to see the earliest economic impact from quantum computing would be chemicals, life sciences, finance and mobility, according to the McKinsey report. To illustrate the need for higher investments in emerging technologies, Nagendra Nagaraja of QpiAI picks out two key trends globally: "One is the transition to sustainable energy. And the other is in manufacturing, where the cost of goods has to come down dramatically." According to him, both quantum technologies and AI play a role here by driving innovation. "Material is central to everything," he says. "If we have 300 error-corrected qubits, then I think material science is all disrupted." There's surely a long way to go. But the seeds have to be sown now. ■

BLENDING TRADITION WITH INNOVATION:

CCRAS's path to Global Ayurveda through human resource development

In the field of traditional medicine, the Central Council for Research in Ayurvedic Sciences (CCRAS) under the Ministry of AYUSH, under the visionary leadership of its Director General Prof. (Vaidya) Rabinarayan Acharya has embarked on several groundbreaking initiatives aimed at mainstreaming Ayurveda through evidence-based research and scientific validation. In this exclusive interview, Prof. Acharya sheds light on the strategic vision, key projects, and future aspirations of CCRAS for developing dedicated human resources for future research in Ayurveda. Join us as we delve into the inspiring journey of CCRAS and its pivotal role in advancing Ayurveda on both national and global platforms:



Prof. (Vaidya) Rabinarayan Acharya
Director General
Central Council for Research in Ayurvedic Sciences (CCRAS)

■ **Prof. Acharya, under your leadership, CCRAS has launched several initiatives aimed at mainstreaming Ayurveda through scientific validation. The SPARK, PG-STAR, PDF, ARMS and PRAYATNA programs have garnered significant attention for their role in promoting research among students and scholars. How have these programs contributed to the development of scientific research in Ayurveda, and what are the future plans for these initiatives?**

The SPARK (Studentship Program for Ayurveda Research Ken) and PG-STAR (Scheme for Training in Ayurveda Research for PG Scholars) programs play pivotal roles in nurturing the next generation of Ayurveda researchers. SPARK provides funding and support to undergraduate scholars, encouraging them to engage in research early in their academic careers. PG-STAR, supports postgraduate scholars in various domains, including clinical, pharmacological, and pharmaceutical research.

For advanced scholars, we offer the Ph.D. Fellowship Scheme, supporting Ph.D. candidates pursuing advanced research in Ayurveda. Additionally, our Postdoctoral Fellowship (PDF) program is tailored for promising fresh Ph.D. graduates of Ayurveda and other related scientific disciplines and postgraduate degree holders in Ayurveda with three years of research experience.

Our ARMS (Ayurveda Research Methodology and Research) program specifically supports first-year postgraduate students by providing them with the necessary resources, mentorship, and guidance to undertake meaningful research projects.

Complementing this, the PRAYATNA initiative focuses on the dissemination of quality scientific articles by final-year postgraduate scholars, ensuring the broader communication and impact of their research. Moving forward, we plan to further expand these initiatives, increase the number of scholarships, and enhance the training modules to incorporate the latest research methodologies and technologies.

■ **Could you elaborate on the strategic vision behind the Ayurveda Gyan Naipunya Initiative (AGNI) and its expected impact on the practice of Ayurveda?**

The Ayurveda Gyan Naipunya Initiative (AGNI) was conceptualized to create a robust platform where Ayurveda practitioners can share their innovative practices and clinical experiences. Our strategic vision is to promote evidence-based practices among Ayurveda practitioners and ensure these practices are scientifically validated. The impact we foresee is a stronger, scientifically-backed Ayurveda that practitioners and patients worldwide can rely on for effective treatments.

■ **The SMART 1.0 and 2.0 programs have been significant in promoting research among teaching professionals in Ayurveda colleges. Can you share how these programs have boosted scientific research in priority healthcare areas and the outcomes achieved so far?**

The Scope for Mainstreaming Ayurveda Research in Teaching Professionals (SMART) program aims to enhance scientific research in priority healthcare areas through teachers in Ayurveda colleges. Out of 90 colleges that applied, 44 projects focusing on six

disease conditions (12 on Osteoarthritis, 12 on Iron Deficiency Anemia, 8 on Psoriasis, and 3 each on Rheumatoid Arthritis, Generalized Anxiety Disorder, and Dyslipidemia) were selected. These projects are being conducted in 38 colleges, including 14 government institutions, based on criteria such as NAAC accreditation, NABH and NABL certification, patient footfall, and specific disease conditions.

■ **Capacity building and training are crucial for advancing Ayurvedic research. Can you discuss the role of the Ayush Diksha and the HRD Cell in enhancing the skills and knowledge of researchers and practitioners in the field of Ayurveda?**

Ayush Diksha is going to be our dedicated human resources development center, focused on training and skill development. It will serve as a comprehensive platform for year-round training and capacity-building programs for all stakeholders in Ayurveda, including students, physicians, teachers, researchers, paramedical, and administrative staff. Ayush Diksha offers a range of structured online and offline courses and programs tailored to meet the needs of each group. The establishment of the HRD Cell at CCRAS Headquarters further enhances these efforts by offering a devoted unit.

With a clear strategic vision and a series of impactful initiatives, CCRAS is poised to achieve greater heights and make significant contributions to the health and well-being of people around the world.



MAHARASHTRA GOVERNMENT'S COMPREHENSIVE RURAL DEVELOPMENT PROGRAM: BLISTERING PROGRESS OVER TWO YEARS

In the past two years, Maharashtra has seen transformative advancements across various sectors under the leadership of Minister Girish Mahajan. From empowering rural women to enhancing infrastructure and housing, the state's comprehensive development programs have significantly impacted rural communities, fostering progress and sustainability.

Over the last two years, the Rural Development Department, under the leadership of Minister Girish Mahajan, has executed a comprehensive development program in Maharashtra. It focuses on empowering rural women through savings groups, providing training and employment to rural youth under the Deendayal Upadhyaya Skill Development Scheme, developing infrastructure like roads, and enhancing pilgrimage and tourist sites. The program, supported by training under the National Gram Swaraj Abhiyan, has shown very satisfactory results.

2022-2024: Summary of Maharashtra's Developmental Efforts

The article summarizes the achievements of

Maharashtra's government initiatives from 2022 to 2024, including housing, rural development, and infrastructure projects. Key achievements include the construction of houses under various schemes, skill development programs, and the development of pilgrimage sites, demonstrating the state's commitment to improving living standards and infrastructure.

Economic Empowerment of Women: Strengthening Through Savings Groups

Emphasizing women empowerment, the Maharashtra government has expanded the network of women's savings groups. From 2022 to 2024, 125,000 savings groups were established, increasing the total to 648,000



"The program of integrated rural development like empowerment of rural women through self-help groups for overall development of rural areas, training and employment of rural youth and women under Deen Dayal Upadhyay Skill Development Scheme, development of infrastructure in rural areas, road development, development of rural pilgrimage and pilgrimage sites and to implement all these schemes effectively training under the National Gram Swaraj Abhiyan for the Panchayat raj system has been implemented by the rural development department in the last two years and its results are very satisfactory".

GIRISH MAHAJAN,
Minister of Rural Development and Panchayat Raj
Government of Maharashtra



in the state. The revolving fund per group was raised from ₹15,000 to ₹30,000, with the government providing ₹1,252 crore. Additionally, women received ₹14,036 crore in loans, with interest subsidies of ₹32 crore given to groups that repaid loans on time. Sales exhibitions for products made by these groups, once limited to Mumbai, have now expanded to regional cities, doubling their turnover from ₹10 crore to ₹21 crore.

Housing Schemes: Completion of One Million Homes in Two Years

Various housing schemes like Pradhan Mantri Awas Yojana (Rural), Ramai Awas Yojana, and others

have been implemented in Maharashtra to provide homes for the needy. From 2016 onwards, schemes such as the Modi Awas Yojana have built 800,000 homes, with another 200,000 in the final stages of completion. The state government allocated ₹9,294 crore for these schemes over two years, focusing on land banks, model homes, and construction training. Maharashtra leads the nation in providing land to 92,333 landless beneficiaries for home building.

Skill Development for Rural Youth: Creating Employment Opportunities

The Deendayal Upadhyaya Gramin Kaushalya Yojana has provided free residential training to thou-

sands of rural youth aged 18-35 in various trades, including retail, hospitality, and IT. The training includes transportation, materials, and meals, with a 70% job guarantee. In the past two years, 15,719 youths have been trained, with 10,480 securing jobs, including 12 employed in Dubai.

Infrastructure Improvement: Approval of 40,000 Kilometers of Rural Roads

Recognizing the importance of connectivity, Maharashtra approved 40,000 km of rural roads under the Mukhyamantri Gram Sadak Yojana from 2022 to 2024. The program, initiated in 2015 by former Chief Minister Devendra Fadnavis, aims to improve





rural connectivity, following the Pradhan Mantri Gram Sadak Yojana model. Phase 2 includes 30,000 km, with 7,000 km approved in February 2024 and 23,000 km in March 2024. Roads will use Thin White Topping (TWT) technology for durability.

Integrated Rural Development Approach: New Steps and Success Stories

The Rural Development Department, under Minister Girish Mahajan, has implemented an integrated development strategy in Maharashtra, focusing on various rural aspects. This includes expanding infrastructure, empowering women's savings groups, and providing local training for youth. The approach aims to ensure comprehensive progress by addressing all related sectors simultaneously.

Development of Projects Suggested by Public Representatives: ₹7,184 Crore of Initiatives

In Maharashtra, works suggested by public repre-

sentatives have been executed, creating a network of basic facilities in rural areas from 2022 to 2024. Projects worth ₹7,184 crore were approved, covering roads, drainage, protective walls, tree planting, and more. The program includes 1,988 approved Gram Panchayat buildings, 1,255 crematoriums, 200 Zilla Parishad schools, 66 libraries, and 523 gyms.

Training in the Panchayat Raj System: Government's Steps Towards Good Governance

The Panchayat Raj system in Maharashtra, comprising Gram Panchayats, Panchayat Samitis, and Zilla Parishads, trained 2.1 million representatives and employees over two years. The training aimed to enhance governance and included 693,518 representatives. Maharashtra leads in training under the National Gram Swaraj Abhiyan, creating 15,951 trainers. The state also developed a roadmap for localizing Sustainable Development Goals (SDGs).

Accelerated Construction of Gram Panchayat Offices: ₹229 Crore Fund Allocation

Maharashtra is accelerating the construction of Gram Panchayat offices, with funds allocated for 2022-2024. The government approved 1,988 buildings, including 1,260 under the Balasaheb Thackeray Smriti Matoshri Gram Panchayat Construction Scheme. Previously, Gram Panchayats had to contribute 10% of the cost, but this requirement has been removed, with the state covering 100%. In 2023-24, the government allocated ₹229 crore, with an additional ₹37 crore approved for 178 buildings in June 2024.

Development of Pilgrimage Sites: Modernizing Ancient Traditions

Maharashtra's Rural Development Department is enhancing pilgrimage sites by providing various facilities. Inspired by Punia Ahilyadevi Holkar, who built temples and developed pilgrimage sites, the

department launched the Punia Ahilyadevi Holkar Rural Pilgrimage and Tourist Site Development Scheme. Minister Girish Mahajan aims to develop sites like the Kashi Vishwanath Corridor. The budget for Class B pilgrimage sites increased from ₹2 crore to ₹5 crore, with 159 sites receiving Class C status from 2022 to 2024. Major sites received ₹25 crore, with projects for the Shri Sant Sewalal Maharaj Institution in Washim allocated ₹397 crore.

Pilgrimage Management: Government Measures for Ashadhi Pilgrimages

For the Ashadhi Pilgrimage processions from 2022 to 2024, the Maharashtra government provided clean drinking water, temporary sanitation facilities, health services, and accommodation. A record

₹77.71 crore was allocated, with funds provided for all main processions. Rural Development Minister Girish Mahajan personally oversaw the planning in Pandharpur, ensuring the pilgrimage was clean, green, and healthy.

New Scheme for Banjara/Laman Tanda Prosperity: ₹500 Crore Budget

The Maharashtra government launched the Sant Sewalal Maharaj Banjara - Laman Tanda Prosperity Scheme on February 23, 2024, aiming to integrate 2-2.5 million Banjara/Laman communities into mainstream development. The scheme focuses on improving living standards and economic independence by providing village status, establishing Gram Panchayats, and relaxing the re-

quirement of a 3 km distance between two villages for creating separate Gram Panchayats. A budget of ₹500 crore is allocated, with ₹30 lakh per tanda approved.

Under the visionary leadership of Girish Mahajan, Maharashtra's rural landscape has been significantly reshaped through comprehensive development schemes. His focus on empowering women, improving infrastructure, and enhancing skill development has laid a strong foundation for sustained growth. As these initiatives continue to evolve, they promise to elevate living standards, foster economic opportunities, and drive holistic progress in rural Maharashtra, ensuring a vibrant and prosperous future for its communities.





By Kris Gopalakrishnan

LEADING THE WORLD OF INFOTECH

From IT services to AI, India is poised to lead the world's digital revolution through strategic investments and innovative policies

In my book, *Against All Odds*, I chronicled the remarkable story of the Indian information technology industry. From just one computer in the country in the mid-1950s, we have come a long way to become the IT capital of the world. In 2024, this industry brought in over \$250 billion (Rs 21 lakh crore) of revenues and contributed 7-8 per cent to the country's GDP. As we stride confidently into the new digital age, the prospects of expanding this digital economy are bright and immense. I will discuss five such pillars that can support this growth:

1. Opportunities for revenue expansion: The first pillar focuses on leveraging and scaling up India's existing strengths in IT services and engineering R&D. As newer technologies such as Generative AI, 6G and industrial metaverse take centre stage, the opportunities in integrating and migrating business systems to these emerging technological paradigms are immense. According to some analysts, AI is expected to add \$15.7 trillion (Rs 1,318 lakh crore) to the global economy, and global GDP could increase by 14 per cent by 2030. In India, we are already seeing companies create new services around data curation and cleansing, and train machine learning algorithms for global customers. Other new allied services include those for posting and monitoring content and achieving geographical and sectoral expansions. To support these expansions, policy reforms must continue—Special Economic Zones (SEZs), Software Technology Parks (STPs) and labour law support for new services, verticals and startups. Finally, we must maintain a stable and predictable policy environment for attracting long-term investments.

2. New opportunities for revenue creation: The second pillar identifies numerous new opportunities for revenue creation. Product startups and SaaS (Software as a Service) applications, particularly in healthcare, insurance, education and digital commerce, hold significant promise. The creative and digital content sectors, including animation, gaming and content creation, are ripe for innovation. Startups in blockchain-based digital assets, geospatial and data



Illustration by NILANJAN DAS

THE GIANT STEPS

➤ **Leverage emerging tech like Generative AI, 6G and industrial metaverse for revenue expansion**

➤ **Foster a vibrant startup ecosystem and deep-tech innovation through funding, mentorship and favourable policies**

➤ **Invest in brand- and capacity-building initiatives across IT, creative, R&D and digital sectors**

➤ **Prioritise societal impact through digital public infrastructure like Aadhaar, UPI and ONDC**

centre services also represent burgeoning areas. For instance, we are seeing the emergence of cloud services in India powered by thousands of NVIDIA H100 GPUs, which are the workhorses of the new GenAI factories.

To seize these opportunities, India must enhance its startup ecosystem. This involves encouraging entrepreneurship, expanding incubation and acceleration infrastructure, and providing robust training for professionals. A strong mentoring network is vital, as is the need to retain startups within India by revisiting tax laws and providing favourable conditions for domestic capital formation. We must replicate startup grants like Karnataka's 'Elevate' programme. The government can also stimulate growth by encouraging procurement of domestic SaaS products and services.

3. Technology fund: The third pillar, a robust technology fund, is essential for sustained innovation. I propose three types of funds.

➤ **Research fund:** Modelled on the National Mission on Interdisciplinary Cyber Physical Systems (NOMICPS), which I chair. It aims to create new technologies with guaranteed funding for 5-10 years. Institutions selected



on a competitive basis are tasked with achieving specific goals related to product or startup creation.

➤ **Venture capital (VC) fund:** It is designed to support diverse startups, investing at the seed or Series A stage alongside selected VC funds. This fund specifically targets underrepresented areas, such as the Northeast, assistive technologies and women-promoted ventures.

➤ **Dedicated deep tech fund:** This will fund deep tech startups, those that emerge as startups from research labs. These startups become the product and technology companies of tomorrow and sell to the world.

4. Branding and capacity-building activities: The fourth pillar is around brand- and capacity-building activities that encompass all services, including IT/ ITEX, creative, R&D, global capability centres (GCCs), data centres and digital technology startups. This requires helping these organisations scale up. Capacity-building will require capacity-building in skilling and training in emerging technologies. It is also essential to grow the talent pool, especially in tier-2/ 3 cities and rural areas, and promote regions close to existing educational hubs such as IIT Dharwad, IIT Indore and IIM Lucknow. Industry organisations like NASSCOM and CII, with support from government bodies like the Department for Promotion of Industry and Internal Trade (DPIIT) and Invest India, have an important role to play here.

5. Societal impact: While Indian companies must expand into global markets, they must also focus on creating significant societal impact within the country. India's extraordinary achievements through its digital public infrastructure (DPI) such as Aadhaar (for identity), UPI (for payments), and Open Network for Digital Commerce (ONDC) have helped it achieve sustainable development in seven years, which otherwise might have taken over 47 years. Now, homegrown AI large-language models (LLMs) around a multitude of Indian languages are being created under the Bhashini initiative of the government. Ultimately, these DPIs should empower the Indian farmer, government schoolteachers and students, MSMEs and citizens. Through efforts like MOSIP (Modular Open Source Identity Platform) at IIIT Bangalore, India is already exporting these DPIs to other countries as well.

By capitalising on opportunities for revenue expansion and creation, establishing a robust technology fund, investing in brand- and capacity-building activities, and prioritising sustainable societal impact, India is poised to lead the world's digital revolution.

The path is clear; the time to act is now. ■

The author is Chairman, Axilor Ventures, and Co-founder, Infosys



By Ashok Jhunjunwala

STRIVE TO BE TECHNOLOGY LEADERS

To propel India's ascent, we should harness its strengths in human capital and tackle pressing societal problems through tech-based solutions

The 'Make in India' programme has given a push to some local manufacturing, but it is merely an assembly job with imported technology and components. The result is a low value-addition. As we aim to become a developed nation, we need to carry out design and development in India, use as many local components as possible, make machinery for production and own a significant part of IPR (intellectual property right) for the products. We need to strive to be amongst the technology leaders in at least a few areas. How do we go about doing it? We need to first understand India's strengths:

- ▶ We now have an increasing number of young scientists and engineers with high-quality expertise, having obtained the best training available. They are raring to go and to lead, if the nation can provide the right push and support.
- ▶ We have a large pool of fresh engineering graduates, and they can be good even if they come from lesser known colleges. They must be motivated to work hard for long hours, learn from each other, and take up impossible challenges. Fortunately, the cost of such talent in India is much lower than elsewhere.
- ▶ We have a very large market, but only for affordable products. This makes the task of developing such products a challenge, but overcoming it would push us towards a leadership position in technology.

Given these strengths, what do we do? We need to, of course, invest in R&D and design products. But when we invest say \$100 million in AI, countries like the US would invest several hundred billion dollars. Trying to compete head-on with the West in areas with very large capital investments is not going to get us far. Instead, we need to focus on some big problems that our society faces and for which we have no solution at present. If we think out of the box and bring together technology expertise from multiple domains, we will create momentum in the right direction. We would have to work extremely hard, be ready to fail, fall and get up again to be able to make progress. As we solve such impossible problems, we will emerge as technology leaders in multiple areas. Let me illustrate this with two examples.



Illustration by NILANJAN DAS

THE GIANT STEPS

- ▶ **Identify and address large-scale societal issues through out-of-the-box, tech-based solutions**
- ▶ **Nurture young talent, empower them to take on ambitious, problem-solving initiatives**
- ▶ **Prioritise design, development and local component manufacturing to increase value addition**

Game-changing systems: Today, in a city like Chennai, it takes over an hour to travel about 15 km between home and office. Wasting over two hours on a daily commute cannot be our future. It is likely to get worse with increasing urban migration and vehicle ownership. Suppose we design a transport system that could make this journey possible in 20 minutes, even in peak time, while addressing some additional issues—be the most energy-efficient transport system (ruling out ideas like flying), and use only green electricity; scale for tomorrow's peak traffic and provide a very comfortable ride (say with air-conditioning); be deployable in existing

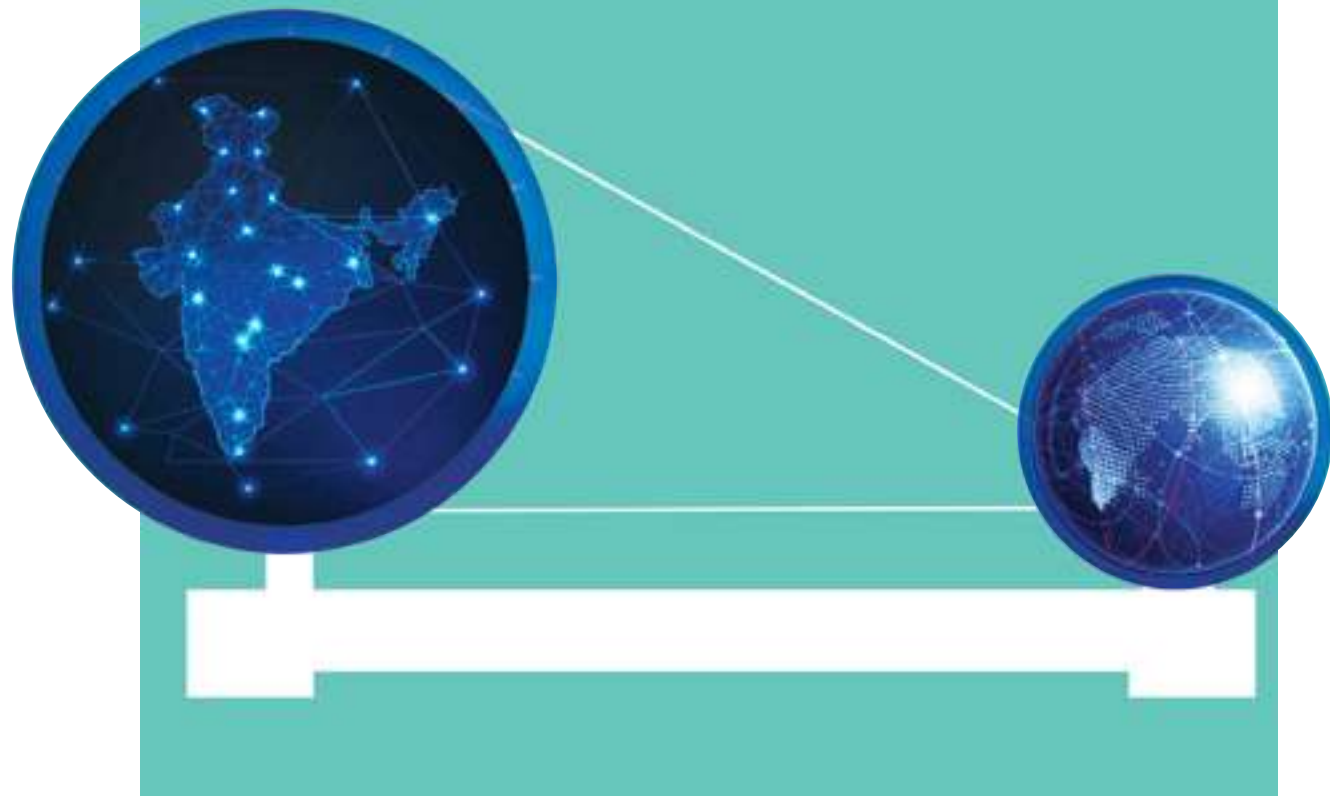
cities with all their constraints; and have a total cost (including depreciation, interest and operating expenditure) less than that of travelling by a two-wheeler today. To conceive, build and operationalise such systems would be game-changing, not just for India, but also for similarly crowded cities elsewhere. This will require multiple technologies and push us to be a world leader.

Virtual experts: Let us take another Indian problem. About 70 per cent of Indian households have monthly incomes less than ₹15,000. When a woman from such a household wants to start a nano-enterprise and needs a mere Rs 1 lakh loan, the first choice is invariably to go to informal sources, where annual interest rates can be as high as 36-60 per cent. Over the last 15 years, microfinance and NBFCs have emerged to provide such loans at about 25 per cent interest rates; their cost of funds, cost of risks, and cost of operations are such that bringing the rates much lower is a serious challenge. There are experts who could visit the woman at her home, talk with her for about 10 minutes, and pose the next question listening carefully to each answer, so as to assess the risk associated with the desired loan accurately. The problem is that such experts do not scale and sending an inexperienced person to do the job increases the risks considerably.

It is here that new technologies can solve the problem non-linearly. Fortunately, mobile phones and WhatsApp video calls have reached even such low-income homes. Suppose we leverage technologies like AI, video and speech processing to send a pleasant-sounding Virtual Expert, who speaks in the local language and dialect with the woman. It would examine the words, expressions and tone of each response and at the same time search for any information about the woman and her financial transactions to pose the next question. One would not only be able to determine risks associated with the business and the loan but could also use similar calls to carry out collections. The costs associated would thus go down considerably, and loans at 15 per cent interest rates would become viable. There is no reason why India cannot build such a technology, use it widely to perfect it and take it to the world.

There are indeed many such large avenues to become the technology leader in the world. We can get there only if we think afresh and have a strong will. ■

The author is an Institute Professor, IIT Madras



UNLOCKING INDIA'S TECH POTENTIAL

As India forges ahead with critical technology partnerships, it must streamline its bureaucratic machinery to fully capitalise on these strategic initiatives

On January 31, 2023, in a packed room at the Chamber of Commerce in Washington D.C., the American and Indian National Security Advisors (NSA) formally launched the United States-India initiative on Critical and Emerging Technologies, or iCET. The NSAs and their administrations—the National Security Council (NSC) in the US and the National Security Council Secretariat (NSCS) in India—anchor this novel

process with the active support of the US state department and the ministry of external affairs (MEA). Potential was the name of the game. An impressive 'fact sheet' highlighted priority areas for cooperation: space, defence, biotechnology, semiconductors, quantum technologies, critical minerals and such. Export control workshops became commonplace. A Strategic Trade Dialogue led by the Indian foreign secretary has been partially designed to engage the matter of controls.

Illustration by NILANJAN DAS

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Legacy agreements were electrified, such as the GE F414 Engine agreement with Hindustan Aeronautics Limited. The American defence 'prime' General Atomics used the energy driven by iCET to return to the sale of MQ-9B HALE Unmanned Aerial Vehicles (UAVs) to India. Both agreements are being currently negotiated.

A canvas has been drawn: From investments in semi-conductors to creating a new strategic technology ecosystem, with active participation from innovators, investors, industrialists and governments, iCET has got off to a more-than-an-impressive start. Following this playbook, in July 2024, the United Kingdom and India entered into a Technology Security Initiative (TSI). This, too, is coordinated by the respective NSAs. The agenda is narrower and focused. It includes cross-cutting areas such as telecom, critical minerals, AI, quantum technologies and biotechnology. From hackathons to bridges for knowledge-sharing, there is a lot in TSI that, for excellent reason, crosses paths with iCET. This could, in time, support triangular co-operation in some areas between the three countries.

There is no doubt that the Indian leadership has responded with an equal dose of stratagem and tact to the imperatives of a fast-changing world, in at least architecting strategic frameworks for deeper partnerships. This is as much about accessing critical technologies, co-innovating, as it is about incubating new manufacturing and assembly hubs in India. These partnerships could accelerate the ongoing drive to diversify military supplies and shape a future that strikes a near-right balance between nourishing self-reliance and amplifying co-production.

A canvas has been drawn. Industrialists, geeks, coders, export controllers, regulators and continued top-level political leadership will need to drive success over the next many years. Several countries, especially in Asia, are knocking on India's doors for similar arrangements. To be sure, at least three of the six working groups of the Quadrilateral Security Dialogue (Quad) between India, Australia, Japan and the US, which pre-date iCET and TSI, are dedicated to different aspects of technology cooperation.

"Can India arrest the potential that screams out of the various 'fact sheets' and read-outs that inform partnerships such as these?" is the common refrain amongst detractors and believers alike. To me, the answer is a clear yes. On

iCET and aspects of Quad, there is enough evidence to suggest that the initiatives are delivering. Yet, as India enters its 78th year of Independence, and with the view to unlock its own potential, what is needed is an administrative pivot to maximise the possibilities in these less-usual strategic partnerships. Reimagining and re-energising the bureaucratic machine that sometimes sits in silos across New Delhi should be as much of a strategic priority as pumping further funds into strategic incentive schemes and signing new defence

agreements. Speak to those who have been there and done it, "getting the bureaucracy right" is an old and tiring song that never stops playing in the background. That might be so. But it does not take away from the need for change.

Getting the bureaucracy right: The Indian government could consider a new cadre of technology envoys. Many countries have these to good effect. We do not. Envoys need to coordinate. A Special Envoy, potentially in the MEA, could work alongside the NSCS in delivering results. This is just one formula. There will be many. The moot point is about the urgent need for coordinated action and to actively synthesise different lines of effort. Critical technology is transformative and cuts across departments

and ministries alike. Those shaping these efforts will need an adaptive structure.

Further, there is plenty of institutional knowledge amongst officials who have shaped different aspects of a partnership process. As is the practice, for their own administrative futures, they typically move on. These are exactly the kind of people who ought to be nurtured to be part of teams or divisions engaged in the business of iCET, TSI, Quad and other agreements in the offing. The knowledge they possess should be reused, not rebuilt. At the apex of bureaucratic structures, the government has made many effective decisions for continuity. There is a need to expand this verve to different levels of the 'system'.

In sum, there is a need for a call for action that is managerially nuanced and creatively structured. The opportunity cost of not pivoting to new administrative realities could be discriminately high for a country that is poised to shape the future of the world—in one way or another. ■

The author is Director, Carnegie India. Views are personal

THE GIANT STEPS

↳ **Harness the potential in areas like space, defence and semiconductors with strategic tech partnerships along the lines of the US-India iCET**

↳ **Establish a new cadre of technology envoys to coordinate efforts across different government agencies**

↳ **Retain institutional knowledge by nurturing officials who have shaped these partnerships, rather than losing their expertise**



BEYOND THE CYBER PASS

A MILITARY SUPERPOWER

TO BECOME A MILITARY GIANT, INDIA MUST INVEST MORE IN DEVELOPING THE LATEST TECHNOLOGIES, BE ABLE TO PROJECT POWER IN THE INDIAN OCEAN AND FORGE STRATEGIC ALLIANCES

By **Pradip R. Sagar**

Given the comprehensive nature of its defence assets, which span land, sea and air, India seems well positioned to meet the security challenges in a fast-changing world. What helps is that it possesses a nuclear arsenal and has developed a credible nuclear triad, allowing it to deliver nuclear weapons from land, air and sea. This strength in fundamentals also bolsters its influence in geopolitics. India's ranking as the fourth most powerful military in the world according to the 2024 Global Firepower Index reflects its significant role in regional security. But in order to emerge as a major global power in defence, it needs to do plenty more.

For, though India is undoubtedly a regional military power, it is not classified as a 'military superpower' like the US, Russia and China. Experts believe that India's aspiration to become one calls for a multifaceted approach. It involves modernising its armed forces, forging strong international alliances, enhancing training, investing in research and development, boosting cyber warfare and space capabilities, strengthening maritime power, securing economic and industrial support, sharpening intelligence and surveillance, integrating Artificial Intelligence and quantum computing, maintaining nuclear deterrence, even leveraging soft power and diplomacy.

UPSURGE IN SPENDING

Rising regional tensions, particularly with China and Pakistan, amid global security challenges have driven a continuous uptick in India's military spending. While India's defence outlay is just below 2 per cent of the country's GDP (as per this year's budget), we still rank as the world's fourth-largest military spender—behind only the US, China and Russia. The

defence budget for FY25 stood at Rs 6.21 lakh crore, marking a 4.72 per cent increase from the previous year, with a substantial focus on capital expenditure to modernise defence capabilities and big-ticket acquisitions. Almost a third of the budget—Rs 1.72 lakh crore—is the capital outlay for modernisation. Estimates suggest that the Indian armed forces will spend \$130 billion (Rs 10.89 lakh crore) on capital procurement over the next five-six years.

Along with modernisation, investing in R&D through institutions like the Defence Research and Development Organisation (DRDO)—in collaboration with the private sector wherever feasible—is critical for accelerated development of cutting-edge solutions. While the DRDO gets an outlay of Rs 23,855 crore, another Rs 13,208 crore is earmarked for fundamental research and developing new technology.

STRENGTH OF OUR FORCES

On the face of it, the Indian military's inventory is impressive. The 1.4 million-strong Indian Army has 4,750 tanks, more than 10,000 armoured vehicles and over 4,000 modern artillery pieces. In addition, there are rocket launchers, nuclear missiles, intercontinental ballistic missiles (ICBMs), tactical ballistic missiles and additional platforms in other branches. The Indian Air Force (IAF) has 170,576 active personnel and over 1,926 aircraft, making it the fourth largest air force in the world. The Indian Navy operates a variety of warships, including two aircraft carriers, 12 destroyers, 12 frigates, 18 corvettes and 16 submarines. The naval force also aspires to having a 175-ship fleet in the next 10 years.

However, there is no room for complacency. Former army chief Gen. Manoj Pande had once said that "we cannot fight

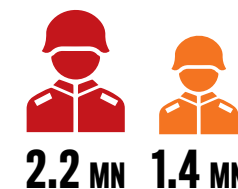
INDIAN MILITARY'S DIRECT HITS

A commitment to indigenisation and acquiring cutting-edge technology can close the gap with China

HOW INDIAN & CHINESE MILITARIES COMPARE

■ CHINA
■ INDIA

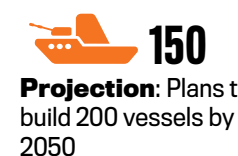
MILITARY PERSONNEL



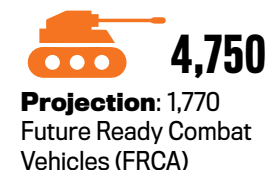
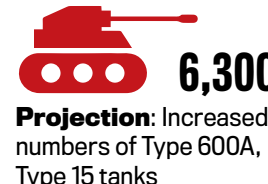
MULTIPLE ROCKET LAUNCHERS



WARSHIPS (approx)



MAIN BATTLE TANKS



COMBAT AIRCRAFT

Projection: Increased production of advanced jets like J20 stealth fighters

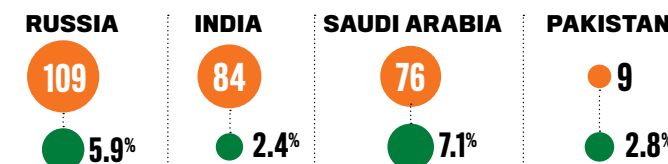
750

Projection: IAF to procure 350 more aircraft over next 2 decades, including 5th generation AMCA stealth fighters

EXPENSES FOR ARSENALS

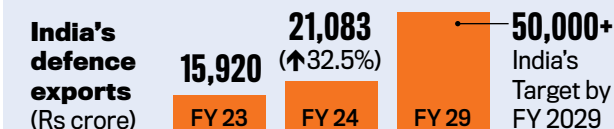
Top military spenders in 2023, including Pakistan

● Military Spend (US \$ billion)
● % of GDP



EXPORTING FIREPOWER

Reflecting increasing global acceptance of Indian defence products and technologies



↘ In contrast, China's share of global arms exports has shrunk from 5.6 per cent (2014-2018) to 5.2 per cent (2019-2023) Value of export in 2022: \$3.24 billion. Quality issues are said to be the reason

↘ Private sector contributed 60 per cent of India's defence exports in FY 2023-2024

↘ Indian defence equipment exported to 10 countries; China supplies weapons to over 53 nations

MODERNISING THE ARMED FORCES ENTAILS TECHNICAL UPGRADATION, A PUSH TOWARDS INDIGENISATION, AND INTEGRATING AI AND CYBER WARFARE CAPABILITIES

and win future wars on borrowed technology", thus indicating India's worrisome dependence on foreign armaments. A reversal of this trend in recent years—indigenous production under initiatives like 'Make in India'—has been encouraging and is crucial for reducing dependency on foreign arms imports.

AATMANIRBHARTA IN DEFENCE

There has been a marked improvement in India's domestic defence production in the past decade. In FY24, it was valued at Rs 1.27 lakh crore, a record high and a 16.7 per cent increase over the previous year. It was, in fact, the second year in a row that India's defence production surpassed Rs 100,000 crore. Private sector companies contributed 21 per cent of the total or Rs 26,506 crore. As per defence ministry data, more than 14,000 MSMEs and close to 350 start-ups are engaged in defence production in India. The government has set an annual defence production target of Rs 300,000 crore by FY29, which would be an over three-fold jump from current levels. To help defence production, the government liberalised the defence foreign direct investment (FDI) regime by enhancing the earlier foreign equity cap from a maxi-

mum of 26 per cent under the automatic route—first to 49 per cent and subsequently to 74 per cent. The FDI liberalisation has led to an inflow of Rs 5,700 crore till 2024.

Buoyed by the domestic industry's growing capability, the MoD is increasingly awarding complex projects to the industry, both private and public. In 2023, the MoD signed contracts with the domestic industry for medium power radars and an integrated electronic warfare system (Bharat Electronics), HTT-40 basic trainer aircraft and Dornier-228 aircraft (Hindustan Aeronautics Limited), cadre training ships (L&T), improved Akash Weapon System (Bharat Dynamics Limited), Offshore Patrol Vessels and Missile Vessels (Goa Shipyard Limited and Garden Reach Shipbuilders and Engineers), Fleet Support Vessels (Hindustan Shipyard Limited) and upgraded super rapid gun mount (Bharat Heavy Electrical Limited).

India has also steadily indigenised its military capabilities—warships like the frigate INS *Sahyadri* and the aircraft carrier INS *Vikrant* and the LCA Tejas fighter jet are testimony to that. We have also started exporting military equipment, like the sale of BrahMos missiles to the Philippines.

COMBINING FORCES

The global geopolitical landscape is marked by significant disturbances, including the ongoing Ukraine-Russia conflict, escalating China-Taiwan tensions and persistent instability in West Asia. Additionally, the rivalry between the US and China, characterised by trade wars and military posturing, has further exacerbated global tensions. Forging strategic alliances with global powers such as the US, Russia, Israel and France can facilitate technology transfers, joint military exercises and strategic collaborations. Additionally, engaging in regional security frameworks like the Quadrilateral Security Dialogue (QUAD) enhances cooperative defence strategies and ensures a collective security approach in the Indo-Pacific region.

In terms of structural changes, India appointed a Chief of Defence Staff (CDS) in 2020 to head the newly curated Department of Military Affairs (DMA) to enhance jointness, integration and theaterisation within the Indian military so that the three services utilise their resources in an integrated way. Further, Parliament passed the ISO or the Inter-Services Organisations Act in 2023 to govern the reformed “integrated system” and to regulate the personnel deputed in joint inter-service organisations. India must also establish its theatre commands soon. The creation of military theatre commands and the expansion of our maritime footprint across ‘strategic locations’ in the Indian Ocean Region (IOR) will improve our overall defence capabilities.

Every military superpower has the ability to project power across their neighbouring seas and oceans. To be counted as one, India has to strengthen its maritime capabilities to secure its interests and project power in the Indian Ocean and beyond. This requires a blue-water navy—comprising modern ships, submarines and aircraft carriers—capable of extended

TAKEAWAYS

- **Though India's military inventory and nuclear triad are impressive, it's too dependent on foreign armaments**
- **The IAF is now focusing on exploiting the “air and space continuum” for a “Space Vision 2047”**
- **Increasing domestic defence production and exports are encouraging**
- **Steps towards creating joint military commands are crucial for effective operations**

operations and safeguarding trade routes. The IOR's importance in global trade and geopolitical competition is growing, with its vital maritime trade routes serving as ‘strategic high-ways’ connecting West and Southeast Asia, East Asia, Europe and the Americas. India is the resident power in the region. While efforts are on to narrow the gap between the Indian and Chinese navies, India's maritime fleet still has only around 150 warships, while China has 370 warships, a number expected to rise to 435 by 2035. India has made some strategic moves to counter China's naval expansion into South Asia.

BREACHING AEROSPACE FRONTIERS

In addition to space exploration by the Indian Space Research Organisation (ISRO), space is now a vital extension of air security too. To that end, the new doctrine of the IAF focuses on effective exploitation of the “air and space continuum” and talks about a “Space Vision 2047”. To move from being a “potent air power” to a “credible aerospace power”, the IAF plans to deepen its intelligence, surveillance and communication capabilities through the use of space technology. With help from DRDO, ISRO and others, it now plans to develop niche technologies like military satellites to meet India's security objectives, including safeguarding our space-based assets.

With the adoption of latest technologies, cyber capabilities are becoming increasingly important in modern warfare. Developing robust cyber defence mechanisms and offensive capabilities will protect against cyber threats and ensure resilience. India has been taking steps to ensure this.

Economic and industrial support ensures sustained military modernisation. A substantial defence budget, coupled with a strong industrial base, will support continuous innovation and production of advanced military hardware in India. This is imperative if we have to counter the burgeoning military capability of India's main adversary, China. Keeping an aggressive China at bay is India's biggest defence challenge as it marches on in its quest to be among the big boys of world security. ■



ONE STOP SOLUTION FOR CUSTOMERS IN AEROSPACE & DEFENSE

Raghu Vamsi Machine Tools Pvt. Ltd. has established itself as a formidable name in precision manufacturing, especially for the aerospace and defense sectors. With two decades of excellence, the company is now poised to become the premier one-stop solution for Global Aerospace and Defense customers, enhancing its capabilities and services to meet the evolving demands of the industry making products.

A LEGACY OF EXCELLENCE & FUTURE-READY

The company's legacy is marked by partnerships with industry giants such as Boeing, GE Aviation, Collins Aerospace, and Honeywell. Its in-house capabilities span critical manufacturing technologies, design and development, prototyping, and high-precision manufacturing. With a diverse portfolio that includes defense applications like loitering munitions, unmanned combat vehicles, and advanced electro-optic systems, Raghu Vamsi Machine Tools has consistently delivered critical subsystems for every missile produced in India and numerous ISRO missions.

CUSTOMER-CENTRIC DEDICATED CELLS

One of the most significant advancements at Raghu Vamsi Machine Tools is the introduction of dedicated cells for each customer. These specialized cells, equipped with state-of-the-art machines, ensure a focused approach to individual customer requirements, guaranteeing superior delivery and quality. This tailored setup not only enhances operational efficiency but also fortifies the company's commitment to meeting specific client needs with precision and reliability.

STRATEGIC JOINT VENTURES

In a strategic move to bolster its technological edge, Raghu Vamsi Machine Tools with Arrobot has started, an automation company specializ-

ing in the development of automated solutions for manufacturing. This collaboration is set to revolutionize the production of aerospace and defense components, enhancing efficiency and precision. The integration of advanced automation technologies underscores the company's forward-thinking approach and commitment to innovation.

GLOBAL EXPANSION THROUGH ACQUISITIONS

Raghu Vamsi Machine Tools is also making significant strides on the global stage with the acquisition of companies in the USA and UK. These strategic acquisitions are aimed at enhancing the company's capabilities and climbing up the value chain. By bringing international expertise and advanced technologies into its fold, Raghu Vamsi is set to offer more sophisticated and comprehensive solutions to its global clientele.

As it continues to expand, with plans to triple its capacity at the new facility in Hyderabad's Hardware Park, Raghu Vamsi Machine Tools remains committed to its vision of growth and innovation. Under the dynamic leadership of Managing Director Mr. Vamsi Vikas, and supported by a proficient management team and an experienced advisory board, the company is well-positioned to set new benchmarks in the aerospace and defense manufacturing sectors.

FUTURISTIC PRODUCTS MANUFACTURED AT RAGHU VAMSI

Category	Sub Category	Parts/Product
Aerospace	Aircraft	Aero Structure, Gears, Landing Gear, Valve and Flow Control, Fuel & Actuator
	Aero Engines	Fuel Nozzles, Engine Seal, Turbine Disc, Combustion Liners
	Missile	Rocket Motor Casing, Thrust Vector Control, Laser Seeker, launcher
	Micro Turbo Jet Engine	For UAV, Missile, Jet Pack, Air Taxi
Defense	Space	Ball Lock Separation System, Exhaust Liner, Parachute Chassis, Fuel Adapter Assembly, Parachute Separation System
	Drones	Loitering Munition, Tethered Drones
	Robotics	Unmanned Guided Vehicle, Gun Simulator Multi Motion Target System, Autonomous Aircraft Tugger

With these strategic initiatives and unwavering dedication to quality and innovation, Raghu Vamsi Machine Tools Pvt. Ltd. is truly the new one-stop solution for customers in aerospace and defense, ready to meet the challenges of the future with confidence and expertise.



“ I extend my congratulations to the Uttarakhand government for the achievements made in recent years. These advances have been made possible through continuous policy encouragement and a focus on key sectors such as tourism and renewable energy. Additionally, the state has made significant progress in infrastructure development, setting new standards for sustainable development. The commitment to utilizing its natural resources and promoting tourism has not only strengthened the economy, but has also showcased the state's potential on the global stage. I appreciate the state's dedication to inclusive growth and look forward to its continued success in the years to come.

– **Narendra Modi**, Prime Minister

UTTARAKHAND

SHINES IN SDG INDIA INDEX 2023-24 A BEACON OF PROGRESS

Under the astute guidance of Prime Minister Narendra Modi and the visionary leadership of Chief Minister Pushkar Singh Dhami, Uttarakhand has emerged as a standout performer in the latest SDG India Index 2023-24, released by NITI Aayog. Uttarakhand has set new benchmarks by excelling in several critical areas, including health, clean energy, poverty alleviation, urban sustainability, and environmental protection. This outstanding performance underscores the state's commitment to sustainable development and its relentless pursuit of progress across key indicators.

In a remarkable feat, Uttarakhand has emerged as a leading performer in the SDG (Sustainable Development Goals) India Index 2023-24, achieving a stellar score of 79, alongside Kerala. Under the visionary leadership of Prime Minister Narendra Modi and the dynamic guidance of Chief Minister Pushkar Singh Dhami, Uttarakhand has made significant strides in various key areas, including development, renewable energy promotion, health infrastructure enhancement, urban environment improvement, and biodiversity preservation. These concerted efforts highlight the state's unwavering commitment to sustainable development and effective policy execution. As a result of these achievements, Uttarakhand has secured a position among the top five states in several Sustainable Development Goals (SDGs).

EXPANSION OF AFFORDABLE AND CLEAN ENERGY

Uttarakhand's performance in the SDG India Index highlights its commitment to providing adequate, sustainable, and clean energy to its citizens. The state has made substantial progress by significantly boosting its renewable energy capacity, particularly through harnessing its hydropower resources. Efforts to enhance energy efficiency, extend the power grid to rural and remote areas, and ensure widespread access to clean energy have been central to its strategy. These initiatives not only support environmental sustainability but

also bolster energy security, positioning Uttarakhand as a leader in this crucial area.

POVERTY ALLEVIATION AND FINANCIAL SECURITY

Uttarakhand has demonstrated remarkable progress in the realm of poverty alleviation and financial security, emerging as a leader in the SDG of reducing poverty. The state has implemented a range of initiatives aimed at reducing poverty and enhancing financial inclusion. These include targeted welfare programs, employment generation schemes, and microfinance opportunities designed to uplift marginalized communities and support small-scale entrepreneurs.

The state's successful policies feature focused strategies aimed at enhancing access to essential services like business development, housing, education, and healthcare for underserved communities. These comprehensive efforts have collectively propelled the state to a leading position in poverty alleviation.

HEALTH BENEFITS TO ALL

Uttarakhand has made significant strides in advancing its healthcare services, achieving notable improvements across various health indicators such as maternal and child health, immunization rates, and the management of both communicable and non-communicable diseases. The state's robust efforts to enhance healthcare infrastructure, extend services to remote regions, and elevate the quality of care have proven highly effective. Increased investment in public health and a focused health agenda have further bolstered Uttarakhand's standing, positioning it among the top performers in health achievement.

SUSTAINABLE CITIES AND COMMUNITIES

Uttarakhand has made impressive strides in fostering inclusive, safe, and sustainable urban environments. The state has rolled out various initiatives aimed at enhancing urban

infrastructure, upgrading public services, and promoting sustainable urbanization. Key efforts include the creation of smart cities, implementation of affordable housing projects, and integration of disaster risk reduction strategies into urban planning. These measures

have significantly improved the quality of life for urban residents and have positioned Uttarakhand as a leading state in developing sustainable cities and communities.

CONSERVATION OF TERRESTRIAL ECOSYSTEMS AND BIODIVERSITY

Uttarakhand's dedication to preserving terrestrial ecosystems and biodiversity is prominently reflected in its SDG India Index rankings. The state has made relentless efforts to conserve and rejuvenate its forests, understand their diverse ecosystems, and combat land degradation.

Uttarakhand's rich biodiversity and extensive forested areas are vital assets, safeguarded through various environmental initiatives and community-driven conservation strategies. The promotion of sustainable agriculture and forestry practices has further bolstered the state's ecological balance, ensuring the long-term sustainability of its natural resources.

Uttarakhand's approach to development seamlessly integrates economic growth with social inclusion and environmental stewardship, underscoring its commitment to achieving sustainable development goals.

COMMITMENT TO CLEAN WATER AND SANITATION

Uttarakhand has made substantial progress in the realm of clean water and sanitation, positioning itself as a leader in this crucial Sustainable Development Goal. The state has implemented comprehensive strategies to ensure the provision of safe and clean drinking water to all residents, particularly in rural and underserved areas. Initiatives such as the enhancement of water supply infrastructure, construction of modern sewage treatment plants, and promotion of effective waste management practices have been pivotal. Uttarakhand's commitment to improving sanitation facilities is reflected in its efforts to promote hygiene education, build community toilets, and ensure the sustainable management of water resources.



“ Under the visionary leadership of Hon'ble Prime Minister Narendra Modi, we are committed to the holistic development of our state by harnessing its natural beauty, rich cultural heritage, and immense potential. Our goal is to promote economic development, improve infrastructure, and enhance the quality of life of our citizens through sustainable policies and strategic initiatives. We aspire to make Uttarakhand a model of progress, where tradition meets innovation. Every person can make a significant contribution to the prosperity and well-being of the state.

— **Pushkar Singh Dhami**,
Chief Minister, Uttarakhand



READYING OUR ARMED FORCES FOR TOMORROW

Space, cyberspace, AI-enabled systems—the fields of future battles are dynamic. To meet its challenges, the Indian army has to be ahead of the curve technologically and maintain quality ‘boots on ground’



By Gen. (Dr) Manoj Mukund Naravane (retd)

Armies the world over are often accused of always fighting the ‘last war’. Yet, when they crystal-gaze into the future, they are accused of watching too much science fiction. The truth, as usual, is somewhere in between. The sci-fi of yesteryear is today’s reality, just as the sci-fi of today may well be the future. Warfare has evolved in time and space, with its character changing so much that a soldier of even just a generation ago will be unable to adjust to the realities of the current battlefield. Similarly, today’s generation will be equally perplexed with the battlefield environment as little as 20 years down the line, as the pace of technological change today far exceeds that of the past. Preparing the armed forces of the country to be future-ready calls for harnessing insights of the past,

Illustration by NILANJAN DAS

THE GIANT STEPS

- **New weapon systems have to be continuously developed for conflicts in a state of flux**
- **Advanced assault rifles, howitzers, better cybersecurity, strategic mobility are things needed by the Indian armed forces**
- **Strengthening defences against cyber threats and developing offensive cyber capabilities are equally important**
- **Technology by itself won’t win wars. The human element in war remains vital**

learning from experiences of the present and extrapolating these for the future.

The most important facet is to be able to identify and then occupy or control the proverbial ‘high ground’, so essential for victory. In the past, the side that dominated the hill tops was decidedly at an advantage, as it not only made their positions more secure, it also enabled them to see what lay on the ‘other side of the hill’. This ‘high ground’ moved on to domination of the air space above the battlefield, no longer remaining a terrestrial construct. Domination of the air became a prerequisite for the conduct of successful ground operations. Where do we further move on to?

The arena in the future may well be space, including cyberspace. Efforts to develop space-based weapon systems and Anti-Satellite Systems (ASAT) are well under way. So are efforts to develop Near Earth Orbit and High-Altitude Pseudo Satellites (HAPS). All these are pointers to where the battle might be fought in the future. In this battle, cyber warfare will have a major role to play. The basic strategy has not changed, only the place and manner in which it is to be applied has. India has created a tri-service cyber agency headed by a two-star general or equivalent. Perhaps this would be the right time to upgrade it to a command as part of the theaterisation process.

AI-enabled unmanned systems: The impact of technological developments, including quantum technologies and artificial intelligence (AI), on our war fighting methodology and the weapon platforms in our inventory necessitates a review. The dynamics of the battlefield are in a never-ending state of flux. Newer weapon systems have to be developed and existing platforms have to adapt to changing conditions. While changes in tactics, techniques and procedures may mitigate deficiencies in current platforms, a hard look is required on the future of main battle tanks, aircraft carriers and other large surface combatants, and manned aircraft, drawing from the lessons of current conflicts. The future will lie in larger numbers of low-cost AI-enabled unmanned systems. Current platforms with

contemporary add-ons and countermeasures have become too unwieldy. Moreover, the high cost of current platforms will make commanders hesitant to commit them to battle. The Indian Army’s modernisation efforts should focus on key areas, aimed at making it more agile, technologically advanced and capable of addressing diverse security challenges. For technology/ equipment upgrades, the army needs to replace outdated rifles with modern assault rifles/ carbines. It also has to acquire advanced howitzers and rocket systems and enhance anti-aircraft and anti-drone capabilities. An upgrade to secure, integrated communication networks is crucial too.

Cybersecurity has gained increased salience in recent decades. Thus, strengthening defences against cyber threats and developing offensive cyber capabilities are equally important. Strategic mobility and logistics determine a military’s defensive and offensive capabilities, and improving rapid deployment and sustainment capabilities and enhancing infrastructure along border areas are important.

The armed forces operate with immensely skilled professionals. Training and skill development for soldiers, especially for Agniveers, and leadership development and joint operations training for others, are vitally important.

Investing in indigenous defence technologies reduces dependence on foreign arms, and collaborating with research institutions and the private sector can achieve that. For achieving jointness and integration, there should be coordination of operations with other armed forces, enhancement of interoperability, and theaterisation.

Technology will no doubt shape the character of war. However, there is a need to balance human resources and technology. In spite of technological developments over the centuries, ‘boots on ground’ remain critical, as the primacy of land will remain paramount.

In the words of historian T.R. Fehrenbach, “You may fly over a land forever; you may bomb it, atomise it, and wipe it clean of life, but if you desire to defend it...you must do this on the ground, the way the Roman legions did—by putting your soldiers in the mud.” This basic truth has not changed. The ongoing war in Ukraine is a testament to this fact. Our wars will be fought in the sand, mud and snow; in deserts, plains, mountains and jungles; over the land, sea and air, by our soldiers, sailors and airmen, with victory measured in terms of square kilometres won or lost.

It is human to focus on the known. The need of the hour is for military strategists and planners to look for answers in the proverbial blind spot, the unknown, which will only be possible by shedding entrenched concepts and overcoming prejudices. Over-reliance on any one facet, particularly the feeling that technology by itself will win wars, is misplaced. Notwithstanding our imperfections, the day technology supplants humans will be the end of humanity as we know it. ■

The author is a former Chief of Army Staff



By Adml Sunil Lanba (retd)

INDIAN OCEAN AS INDIA'S OCEAN

The Indian Navy has been bolstering maritime security through improved maritime domain awareness and forging networks with nations of the Indian Ocean Region. But India must invest more in maritime capability if it is to be pre-eminent in the IOR

The Indian Ocean is the third largest ocean in the world, and the nations along its periphery and hinterland account for over 35 per cent of the global population and some of the fastest growing economies in the world. The Indian Ocean Region (IOR) has emerged as a significant driver of global economic growth.

Two-thirds of global oil shipments, half the world's container traffic and one-third of bulk cargo shipments traverse through the international sea lanes of the IOR. India's central position in the IOR, astride the important sea lanes of the world, gives us immense strategic advantages. It facilitates reach, sustenance and mobility of our maritime forces, thereby giving us an ability to effectively influence this maritime space. While geography affords us opportunities to harness the seas to our advantage, it has also placed us at the very centre of the ongoing 'strategic churn' taking place in this region. Its impact on us in the future will be determined by our outlook and choices that are adopted today.

There is an old adage among sailors that, 'while borders divide, the seas connect'. Accordingly, navies have endeavoured to build partnerships, mutual trust and confidence with friendly foreign countries. In the contemporary geostrategic landscape, the Indian Navy's cooperative initiatives provide significant tools for India's foreign policy to work towards making the IOR India's ocean.

We are aware of the ongoing contest for influence in our region, where extra-regional countries, China in particular, have used economic, diplomatic, cultural and military tools to gain advantage. Growing regional military presence, coupled with overseas bases and dual-use maritime infrastructure will allow Beijing to influence the vital sea lanes of the IOR and give them the ability to interfere with Indian interests. Cognisant of these changing dynamics, the government and the Indian Navy have accorded a high priority to maritime security in all bilateral relations and stepped up efforts to build stronger networks among all IOR littoral states.

The Indian Navy's efforts can be broadly divided into four categories: capacity-building, capability-enhancement, cooperative engagement and collaborative efforts. The navy has constructively engaged the IOR littorals to build their capacities and enhance their capabilities, so that the collective ability to deal with various



Illustration by SIDDHANT JUMDE

maritime security challenges is further strengthened.

Any operation at sea is dependent on Maritime Domain Awareness (MDA). To develop a comprehensive MDA, the navy regularly patrols the far reaches of the IOR through Mission-Based Deployed ships, Boeing P8I maritime patrol aircraft/ Sea Guardian UAVs, and monitors it by satellites. It has set up coastal surveillance chains in the Seychelles, Mauritius, Maldives and Sri Lanka. The 'Information Fusion Centre for Indian Ocean Region' at Gurugram has established itself as a hub for MDA in the IOR by coordinating with over 20 countries and multinational constructs. Inputs are collated to develop a comprehensive MDA, which is shared with partners.

The reach of the navy has been extended through bilateral logistics treaties, operational turnaround facilities/ ports and building port infrastructure. The Indian Navy participates in over 20 bilateral and multilateral exercises each year.

Our exercises with maritime powers have expanded over the years, and now involve complex multi-dimensional operations. The Malabar exercise with Quad partners is a prime example. In the Bay of Bengal, the navy carries out coordinated patrol of the maritime borders with Bangladesh, Myanmar, Thailand and Indonesia. It also carries out surveillance of the Exclusive Economic Zone (EEZ) of the Maldives, Seychelles and Mauritius as they lack the capacity to patrol their large EEZ.

Training is another key aspect of our efforts. Every year, the navy provides structured training to over 900 foreign trainees. Hydrographic cooperation is another area of focus. Ships have conducted vital surveys for Myanmar, Mauritius and Sri Lanka. Lastly, the navy supports multilateral initiatives such as the Indian Ocean Naval Symposium (IONS) to enhance regional maritime security.

THE GIANT STEPS

Our outlook and choices today will determine how India can harness its central position in the IOR, which puts us both at a strategic advantage and in the middle of a strategic churn

Economic, diplomatic and military tools are likely to allow China to influence IOR sea lanes and jeopardise Indian interests. We need to bolster maritime security through capacity-building, capability-enhancement, cooperative engagement and collaborative effort

The Navy needs a third aircraft carrier, more destroyers and frigates, nuclear-powered submarines and fleet support ships

But all diplomatic initiatives need to be backed by hard power. If we are to be counted in the Indian Ocean, the nation needs to invest more in military capability, especially maritime capability. The navy needs additional blue water ships such as a third aircraft carrier with its air wing, more destroyers and frigates, nuclear-powered attack submarines (SSN) and fleet support ships (tankers) to be the first responder in the IOR.

As the nation rises to the high table of global affairs, India will be called upon to shoulder greater responsibilities in the IOR. The Indian Navy will have a significant role to play to ensure that the nation attains its rightful place in the world order through proactive and positive action. ■

The author is a former Chief of Naval Staff



By Dr
Amitabha
Ghosh



RACE TO BE A SUPERPOWER IN SPACE

To become a space superpower, India has to build on its recent successes, involve the private space sector and aim for global space frontiers

Till as late as 2003, India did not have a planetary science programme. Barely 21 years later, India has successfully landed or deployed multiple rovers and orbiters on the Moon and Mars. The journey of the Indian Space Research Organisation (ISRO) has been spectacular. This is a moment to ask what India needs to become a superpower in space exploration and how it can achieve this.

What does the future, say the next 20-30 years, hold for space exploration? What will its frontier look like in the future? This is the arena where India has to excel and be relevant. Here are some such exciting frontiers in space exploration.



Illustration by NILANJAN DAS

REVOLUTIONIZING HEALTHCARE

CCRH's Visionary Role in Homoeopathic Research

The Central Council for Research in Homoeopathy (CCRH), is making significant strides in bringing Homoeopathy into the mainstream of healthcare. Spearheaded by its visionary Director General, Dr. Subhash Kaushik, CCRH focuses on pioneering initiatives backed by rigorous scientific validation and evidence-based research. In a compelling interview, Dr. Kaushik shares insights into the Council's impactful projects, his strategic vision, and the vital role of Homoeopathy in enhancing public health. Discover the transformative journey of CCRH, as it commits to advancing scientific research and promoting community wellbeing:



Dr. Subhash Kaushik
Director General
Central Council for Research in Homoeopathy (CCRH)

Dr. Kaushik, under your leadership, CCRH has reached several key milestones in advancing Homoeopathy through research. Could you share your strategic vision for the Council and explain how it aligns with Prime Minister Modi's vision for AYUSH?

Aligning ourselves with the honourable Prime Minister's ideals of "Sabka Saath, Sabka Vikas, Sabka Vishwas, Sabka Prayaas" to build an Aatmanirbhar Bharat, we at CCRH have embarked on a journey of on integrating traditional systems of medicine into mainstream healthcare. Our mission is to promote scientific research in Homoeopathy through a robust network of research and treatment centres. We are collaborating with scientific organizations, university, medical colleges, social organizations, undertaking research projects, research capacity building, enhancing dissemination and translation of research activities. We have a team of over 100 dedicated scientists supported by about 200 supporting technical staff who are Committed for Credible Research in Homoeopathy, our motto for CCRH.

CCRH has made remarkable progress in areas such as drug development, fundamental research and clinical research. Could you highlight some of the most impactful research projects and their contributions to the field of Homoeopathy?

Indeed, our progress in these areas has been remarkable. We have successfully conducted pharmacognostical studies on 368 drugs, Physico-chemical studies on 362 drugs, pharmacological studies on 151 drugs and 149 drugs have been studied in all three aspects. We've validated 132 homoeopathic drugs, with 22 of these being proven for the first time. Our clinical research portfolio

includes 206 observational studies and 129 randomized clinical trials, which have provided valuable insights into the efficacy and safety of homoeopathic treatment. We have undertaken and successfully published research outcomes of studies undertaken on Infectious diseases, life style disorders, respiratory disorders, skin conditions, joint disorders, gastro-intestinal disorders and a host of paediatric conditions. We have also undertaken studies promoting mental wellbeing. We are now also undertaking studies on sports medicine and studies integrating Yoga with homoeopathic care. We are advancing nanosciences research, molecular profiling of drugs, in-vitro and in-vivo laboratory studies, in our inhouse laboratories i.e. a virology laboratory in Kolkata, a HIV laboratory in Hyderabad and a basic sciences laboratory in Shibpur and also in collaboration with reputed scientific organizations.

The integration of Homoeopathy in public health programs, particularly in child care, has been a cornerstone of CCRH's initiatives. How has this integration benefited the community, and what are the future plans for expanding these programs?

Under the vision of the Honourable Prime Minister, we undertook a program on Homoeopathy for healthy child, where in home based care was provided to more than 80,000 children for primary dentition related complaints. The clinical trial unit at Gorakhpur was established in the BRD Medical College, where add on homoeopathic treatment in Acute Encephalitis of children not only prevented mortality, but also reduced post encephalitis disabilities. We undertake public health programs on research mode. Some of our successfully conducted programs are on geriatric care, adolescent care, prevention and control of non

communicable diseases, post-covid disabilities and malnutrition.

Effective dissemination of research findings is crucial for the growth of Homoeopathy. How does CCRH ensure that its research reaches both the professional community and the general public, and what are the future plans for enhancing this outreach?

Dissemination of our research is a key priority. We have been publishing our journal, Indian Journal of Research in Homoeopathy (IJRH) since 2007, wherein we have published 18 volumes comprising 62 issues with research articles on Homoeopathy. To ensure wider reach, the abstracts are published in Hindi, Spanish, French, German and Chinese. We have developed and E-library consortium portal which is open to our collaborating Ministry of Ayush organizations. Further, our IEC materials, such as handouts, short films are designed to educate both professionals and the general public. We also participate in health melas, seminars, and conferences to showcase our research and engage with a broader audience.

Under the dynamic leadership of Dr. Subhash Kaushik, CCRH is set to redefine the landscape of Homoeopathy with its commitment to scientific rigor, innovation, and community well-being. The Council's strategic vision and ground-breaking initiatives promise a future where Homoeopathy is an integral part of global healthcare, providing safe, effective, and personalized treatments. With unwavering dedication, CCRH continues to inspire confidence and trust in Homoeopathy, ensuring a healthier and brighter future for all.

THE GIANT STEPS

- ▶ **Building vastly more powerful launch vehicles will give India more options in space exploration**
- ▶ **Launch cost is critical for frequent space missions. Having reusable launch vehicles cuts costs by over 90 per cent and increases productivity**
- ▶ **India should aim to land astronauts on the Moon by 2050. It is a surefire way to announce its advent as a top space power**
- ▶ **For India to become a space superpower, major technology development should be outsourced to the private sector**

Back to the Moon with humans: The US is all set to go back to the Moon with humans, followed by China. The Artemis Program will put American astronauts on the Moon in 2026. The US has been there before, but this time it will not be to merely visit but to set up a base, which will be staffed by astronauts 365 days a year. It may be supported by multiple governments, like the International Space Station, or it could be private—operated by Blue Origin, owned by Jeff Bezos.

The search for life on Mars: We have learnt a lot about Mars from multiple rover and orbiter missions since 1996. We have learnt about the presence of water at the poles and in the Martian subsurface, we have learnt about Martian earthquakes and dust storms. It is possible that in future, there may be evidence of past life—microscopic in nature—on Mars. The search for life on Mars is expected to continue for the next couple of decades and will remain a frontier of space exploration.

Oceans in the outer solar system: Many of Jupiter and Saturn's moons, like Europa and Enceladus, have oceans below the crust. One of Jupiter's moons, Europa, has an ocean about 100 km below its surface. It might contain two-three times more water than all of the Earth's oceans combined. Since life on Earth originated in the oceans, is it possible that Europa and Enceladus's oceans could have microscopic life? Excitement in the outer Solar System has begun: NASA launches the Europa Clipper later this year. NASA's Dragonfly Mission to Titan (a moon of Saturn) is scheduled to launch in 2028.

Given this kaleidoscope of developments in space exploration, how can India strategically and operationally become a key player and a space superpower? These are some areas to focus on.

More powerful launch vehicles: India needs to develop more powerful launch vehicles. Its most powerful launch vehicle, the GSLV, can deliver 6,000 kg to low earth orbit

(LEO). In contrast, the NASA's Saturn 5 (from the Apollo Program) and Starship (from SpaceX) can deliver 140,000 kg and 250,000 kg respectively to a LEO. For landing humans on the Moon, China is developing its Long March 10 that will deliver about 70,000 kg to LEO. One way for India to become a superpower would be to land an astronaut on the Moon in the next couple of decades. Having a more powerful launch vehicle would enable this. A powerful launch vehicle is a key capability that will provide India with multiple options. For example, it will enable India to send missions to the Outer Solar System: to study Moons like Europa, Enceladus or Titan. It will make possible missions to planets like Jupiter, Saturn and Uranus.

Reusable launch vehicles: The launch vehicles should be reusable. To frequently undertake space missions, the cost of launch is critical. For a manned spaceflight, one mission can cost over \$1 billion. If the launch vehicle is reused, the cost of launch can be decreased by over 90 per cent. Be it a manned or robotic spaceflight, missions to other planets or Earth satellites, the cost of launch is approximately half the total cost. If launch costs can be reduced, cost of savings and increase in productivity are huge. The Falcon launch vehicles developed by SpaceX have been a game-changer because they are reusable.

Human spaceflight: After sending robotic spacecrafts to Moon and Mars, a manned spaceflight is the next logical step for India. Manned spaceflight is harder and more expensive. India should aim to land astronauts on the Moon by 2050.

Implementation model: Despite being a trailblazer in spacecraft missions in the past 20 years, ISRO faces substantial odds to attract and retain talent. The private sector, including MNCs like Google and Apple, pay several multiples more than the salary at ISRO. There are questions of bureaucratic procedures and timelines. These issues can be addressed more effectively by the private sector. Can major technology development projects be outsourced to the private sector for more effective implementation?

When its space shuttles were retired, NASA experimented with a private-public partnership programme called the Commercial Crew Program. NASA gave SpaceX and Boeing about \$2.6 billion and \$4.2 billion to develop a spacecraft which would replace the shuttles. If they were successful, NASA promised to pay them a fee to ferry astronauts to the International Space Station and back. This creates an assured market and a viable business model for SpaceX and Boeing. A decade later, this strategy seems to have worked for NASA: SpaceX has delivered the Crew Dragon spacecraft, a robust alternative to the shuttles, in around a decade. Boeing's Starliner spacecraft is going through the last developmental challenges. ISRO has been increasingly partnering with the private sector; major technology development like the next generation launch vehicle could be outsourced to the Indian private sector. If this works, India can leapfrog its way to become a space superpower by delivering on difficult technology tasks. ■

The author is a planetary scientist at NASA

CUTTING EDGE CURES

**REDEFINING
HEALTHCARE**
A portable X-ray
machine being
used on a patient at
Delhi's Indraprastha
Apollo Hospital

FOR INDIA TO GET BETTER

India's path to becoming a global powerhouse hinges on the well-being of its people. Addressing the dual challenges of rising noncommunicable diseases and an ageing population is essential for sustainable economic growth and prosperity

By **Sonali Acharjee**

The health of India's vast populace is, of course, important for its own sake. It is also a critical component of rapid growth—think of it as the cause, not the effect, of India becoming a global giant. A healthy workforce will be the life-force of our economy. The challenges before us are stark. While making health accessible and affordable to the masses is critical, there has to be a major emphasis on tackling the new epidemic of lifestyle diseases that are classified as noncommunicable diseases (NCDs).

According to a World Health Organization (WHO) report titled 'Invisible Numbers', a staggering 66 per cent of deaths in India in 2019 were attributed to NCDs: high blood pressure, cancer, heart disease, diabetes, lung disease, stroke, renal disease and mental disorders. The report suggests that 22 per cent of Indians then at age 30 or more would succumb to these before their 70th birthday. In 2017, the Indian Council of Medical Research, too, had estimated that the share of deaths due to NCDs in India increased from 37.9 per cent in 1990 to 61.8 per cent in 2016. "Not only is the financial strain of treating NCDs higher, so are the mortality rates," says Dr Dorairaj Prabhakaran, noted cardiologist and Executive Director, Centre for Chronic Disease Control. He also cites the reduction in quality of life that patients suffer. "Unlike an infectious disease, NCDs stay with you for life and need vigilant monitoring and medicine," adds Dr Prabhakaran.

On top of the rising burden of NCDs, there is also a prediction that a large elderly population's health needs will be

specific and call for long-term structures to be put in place. India's current elderly population of 153 million (aged 60 and above) is expected to more than double to 347 million by 2050, according to the United Nations Population Fund. "We must invest in geriatric care. Their health needs are different and they need as much mental and emotional care as they do for physical diseases. We will also need a stronger emergency response system," says Dr Vishal Sehgal, president of home medical care firm Portea Medical, more than 60 per cent of whose services are availed by the elderly. This double whammy of rising NCDs and geriatric health issues has experts convinced that the country must lose no time to build up its infrastructure and improve the costing of healthcare. "The current system will not be able to cope with the rising caseloads. We either need new hospitals or must expand existing ones," says Dr Sumanth C. Raman, author of *Sick Business: the Truth behind Healthcare in India*.

PRIORITISING DIAGNOSTICS

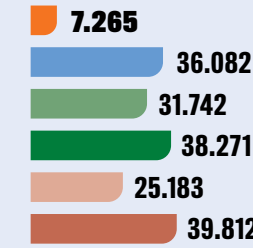
Experts say diagnostic upgrades should be the first priority, as they will help prevent diseases, including infectious ones, in the first place. "Today, diagnostics is key for treatment outcomes. If diseases are caught in time, the recovery is better and NCDs can even be reversed, saving health and finance," says Dr Randeep Guleria, former director of AIIMS, New Delhi. This is already happening for tuberculosis, which the country is trying hard to eliminate. "Now, there is a focus on bringing diagnostics to the primary healthcare level. India

WHERE INDIA STANDS ON HEALTH

To achieve its universal health coverage goal, India must raise diagnostic capacities, improve the health worker-to-patient ratio, reduce out-of-pocket expenditure, expand insurance and implement price controls

DOCTOR-PATIENT RATIO

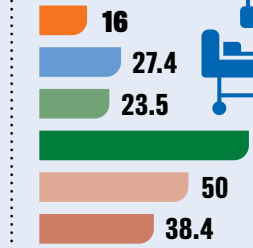
Allopathic doctors per 10,000 population



Source: WHO

HOSPITAL BED-PATIENT RATIO

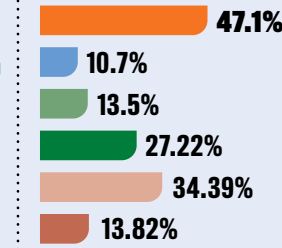
Beds per 10,000 population



Source: WHO

OUT-OF-POCKET EXPENDITURE

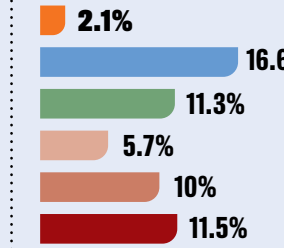
Share in current health expenditure



Source: World Bank

PUBLIC HEALTH EXPENDITURE

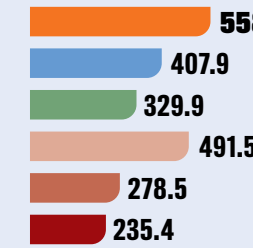
Share in current GDP



Source: Statista

MORTALITY RATE OF NONCOMMUNICABLE DISEASES

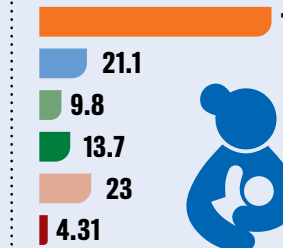
Per 100,000 population



Source: WHO

MATERNAL MORTALITY RATIO

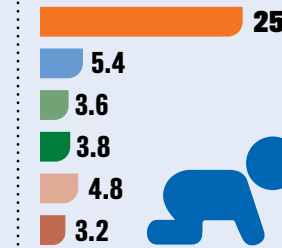
Per 100,000 live births



Source: WHO

INFANT MORTALITY RATE

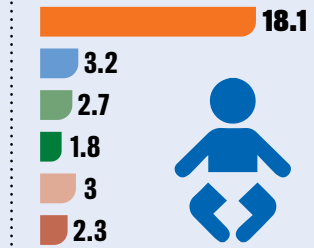
Between birth and 11 months per 1,000 live births



Source: WHO

NEONATAL MORTALITY RATE

Between 0 and 27 days per 1,000 live births



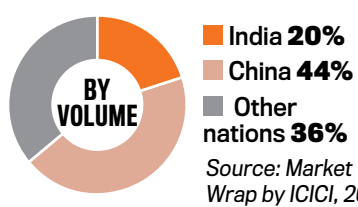
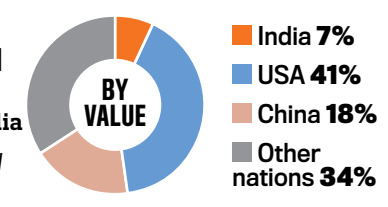
Source: WHO

INDIA USA UK RUSSIA CHINA AUSTRALIA JAPAN

GLOBAL API* PRODUCTION

Over 500 different APIs are made in India

*Active Pharmaceutical Ingredient



Source: Market Wrap by ICICI, 2019

32%

of India's API needs are still met through imports

already has Truenat machines and GeneXpert tests, but one needs significant infrastructure and manpower to run them, which isn't easy to deploy at the lower levels. We are looking at point-of-care machines to enable diagnosis at levels where none is happening currently," says Sanjay Sarin, country director, FIND India, which is partnering with various states to build diagnostic capacities. A vast number of patients are compelled by circumstances to rely on facilities at the local

level, and "it takes a significant amount of time for samples to be sent to the higher levels. One would want to create a sort of multiplex that enables running multiple tests on the same platform, and not just for TB diagnosis. The government is also considering handheld X-ray units which can be taken into the community for diagnosis."

However, scaling up diagnostics can only be done if the number of frontline workers who will take them to commu-

nities is also increased. According to a 2020 WHO report, India needs at least 1.8 million doctors, nurses and midwives to achieve—by 2030—the minimum threshold of 44.5 health workers per 10,000 population it prescribes. A pre-print study conducted this year by WHO Europe and the Public Health Foundation of India, which analysed the active health workforce in India, concluded that the country is still ‘well below the WHO threshold’. The situation is worse in rural areas where almost two-thirds of the population resides. The Rural Health Statistics (RHS) 2021, released by the Union ministry of health and family welfare, revealed a 7 per cent shortfall of doctors at Primary Health Centres (PHCs) and a 57 per cent shortfall at Community Health Centres (CHCs) across rural and urban areas. The report also indicates a nationwide shortage of over 80 per cent of the required surgeons and paediatricians at CHCs. In urban areas, the shortfall of doctors at PHCs is 9.8 per cent, while at CHCs, it’s 34 per cent.

RAISING PUBLIC SPENDING

Indians also face traumatic levels of stress when it comes to healthcare costs. High out-of-pocket expenditure (OOPE) on health pushes about 55 million people into poverty annually, with over 17 per cent of households incurring catastrophic levels of expenditures each year, a March 2022 WHO report estimated. The overall OOPE share had improved over the years to 48.21 per cent in 2018-19 from 69.4 per cent in 2004-05, according to the National Health Accounts (NHA). But it still remains significantly higher than the global average of 18.1 per cent as of 2019, as per the World Bank. For private healthcare settings, the cost of hospitalisation is seven times higher than in government hospitals, revealed the NSS Household Social Consumption statistics for 2017-18. In the early 1950s, the share of the private sector was 8 per cent of the total healthcare market; this has now risen to 70 per cent. “Either the government needs to improve public healthcare systems or bring down costs or grow insurance cover in the private sector,” says Dr Raman.

Increasing public spending to 2.5-3 per cent of the gross domestic product (GDP) can also significantly bring down OOPE to 30 per cent of overall healthcare spend from 48.21 per cent, according to the Economic Survey 2023. Currently, India’s health budget is at 2.1 per cent of the GDP. It was among the 10 worst-performing countries in terms of prioritising health in government budgets, at both state and central levels, according to the Economic Survey 2021. Healthcare affordability can also be improved through pooled negotiation and price control of critical drugs. Take the example of cancer. A study published last year in the journal *Frontiers in Public Health* found that the annual direct OOPE incurred on cancer treatment per patient was estimated at Rs 3.31 lakh. Diagnostics (36.4 per cent) and medicines (45 per cent) are major contributors to OOPE for cancer. To bring down the cost of cancer medicines, 23 hospitals affiliated to the National Cancer Grid, a network of over 250 cancer

TAKEAWAYS

- NCDs cause 66 per cent of deaths in India, highlighting a major health challenge
- Improving diagnostics at primary healthcare levels is vital for early disease detection
- The elderly population is set to more than double by 2050, calling for specialised care
- Lowering out-of-pocket expenditures and expanding insurance coverage are crucial for accessibility

centres that treat over two-thirds of India’s cancer patients, procure through a pilot-pooled programme. The initiative aims to improve negotiability for 40 high-value oncology and supportive-care drugs. A study on the project, published in a WHO bulletin in June 2023, states that the project resulted in savings of Rs 1,320 crore compared to the maximum retail prices. The savings, it adds, ranged from 23 to 99 per cent (median 82 per cent) and were higher with generics than branded and newly patented medicines. Based on the success of pooled procurement, the study authors recommended extending this approach to other programmes with high treatment costs under the NHA, which administers the Ayushman Bharat Pradhan Mantri Jan Arogya Yojana, the government’s health insurance initiative.

EXPANDING INSURANCE COVERAGE

Private players can also help improve affordability, particularly through better insurance plans. The government’s Ayushman Bharat scheme does not cover some critical areas such as OPD, dental and HIV treatment costs, and its Rs 5 lakh coverage is considered inadequate by many doctors for covering surgical as well as long-term NCD treatment costs. “Free healthcare will not work in a country with so many people, we need affordable insurance plans instead,” says Dr Devi Shetty, whose Narayana Health has introduced a new health insurance policy which is being seen as the private sector’s answer to Ayushman Bharat. The scheme offers a sum assured of Rs 1 crore for surgeries and Rs 5 lakh for medical management at its network hospitals for a premium of Rs 10,000 per year. While India remains on the right track—investing in greater public health infrastructure—the efforts need to be accelerated. Increasing diagnostic capacities at the primary healthcare level, improving the health worker-to-patient ratio, bringing down OOPE through increased public spending, insurance coverage and price control mechanisms are needed if we are to achieve the goal of universal health coverage by 2050. ■

UNANI MEDICINE

A Heritage of Healing, A Future of Holistic Healthcare for the Nation and Beyond

The Unani System of Medicine, with its rich historical roots and time-tested treatments, has been an integral part of India’s healthcare landscape for centuries. As the world increasingly turns towards traditional medicine systems for holistic health solutions, India has taken a leadership role in promoting Unani Medicine. At the forefront of this movement is the Central Council for Research in Unani Medicine (CCRUM), under the visionary leadership of Dr. N. Zaheer Ahmed. In this exclusive interview, Dr. Ahmed sheds light on CCRUM’s achievements, strategic vision, and the future of Unani Medicine in India and beyond:



Dr. N. Zaheer Ahmed
Director General
Central Council for Research in Unani Medicine (CCRUM)

- The CCRUM has made significant strides in various research domains. Could you elaborate on the key research areas and how they contribute to the advancement of Unani Medicine?

The CCRUM, an apex research establishment under the Ministry of Ayush, has made significant strides in advancing Unani Medicine through diverse research initiatives.

Clinical Research has been pivotal, with over 130 randomized trials and numerous projects validating Unani drugs for chronic diseases like vitiligo, psoriasis, hepatitis, and asthma. The CCRUM is also developing new drugs for emerging diseases, enhancing dosage forms for diabetes, and exploring the immuno-modulatory effects of Unani treatments.

Fundamental Research has aligned Unani principles with modern science through 30 studies, bridging traditional theories with genetic and biochemical insights.

In **Preclinical Research**, the CCRUM has conducted safety and toxicology studies on 115 single drugs and coded formulations, alongside pharmacological studies on 70 Unani formulations. This ensures that the drugs are safe and effective for public use.

Literary Research reflects the CCRUM’s dedication to preserving the rich heritage of Unani Medicine. This includes the translation of 66 volumes of classical texts, the compilation of 22 books, the creation of a vast database of manuscripts, and the reprinting of over 70 rare classical books.

Drug Standardization has established quality standards for 338 single and 200 compound drugs, ensuring consistent efficacy.

Lastly, through **Survey and Cultivation of Medicinal Plants**, the CCRUM has collected over 1 lakh plant specimens, cultivated rare species, and documented traditional medicinal knowledge, contributing to the

conservation of medicinal biodiversity. These efforts collectively strengthen the scientific foundation and global relevance of Unani Medicine.

Moreover, the CCRUM’s success is deeply rooted in its research collaborations and partnerships. By joining forces with national and international research institutions, universities, and healthcare organizations, it broadens its research capabilities and impact. These partnerships facilitate knowledge exchange, access to cutting-edge technologies, and help the CCRUM tackle research problems and health challenges, positioning Unani Medicine as a credible and complementary healthcare system on the world stage.

- How does CCRUM integrate traditional Unani practices with modern scientific approaches, particularly in the realm of drug standardization and clinical research?

The integration of traditional practices with modern scientific methodologies is at the heart of our research agenda. To ensure the highest standards of safety and efficacy, we use state-of-the-art technologies in drug standardization and clinical research. In drug standardization, our approach involves developing standard operating procedures (SOPs) and pharmacopeial standards that are on par with global benchmarks. This involves modern analytical techniques, including phytochemical analysis and molecular profiling. In clinical research, the CCRUM applies modern scientific rigor to validate the therapeutic benefits of Unani treatments. The studies at the CCRUM utilize contemporary research methodologies, such as randomized controlled trials and evidence-based assessments, while preserving the holistic and individualized approach characteristic of Unani medicine. The CCRUM also collaborate with premier scientific institutes and organizations for integrative research. By merging traditional knowledge with modern science, the CCRUM not only enhances the credibility and effectiveness of Unani Medicine but also ensures its integration into the broader healthcare system.

- Can you discuss CCRUM’s role in promoting Unani Medicine at

the grassroots level, particularly through healthcare services and community outreach programs?

Reaching the grassroots is a critical component of our mission. Unani Medicine has always been a people’s medicine, accessible and affordable, and we aim to keep it that way. Through our network of 23 healthcare centers across the country, we provide comprehensive Unani healthcare services to diverse communities. Under the financial patronage and guidance of the Ministry of Ayush, we operate Unani clinics and health centers across India, offering free treatment and raising awareness of Unani practices. The CCRUM also conducts health camps, school health programs, and public health initiatives like Mobile Health Programme under Scheduled Caste Sub-Plan and Tribal Sub-Plan, ensuring that Unani Medicine reaches underserved populations in rural areas and urban slums at their doorsteps and is integrated into community health practices. These efforts strengthen Unani’s role in primary healthcare and public health education

- What is your strategic vision for the future of Unani Medicine in India, particularly in the context of global health challenges?

My strategic vision for CCRUM and Unani Medicine is deeply aligned with our nation’s broader healthcare goals and the global health challenges we face today. Looking ahead, we aim to further strengthen our research capabilities, particularly in the areas of drug development, clinical research, and digital health initiatives. By leveraging digital platforms and telemedicine, we plan to bring Unani healthcare to even the most remote areas. The focus will also be on increasing the global reach of Unani Medicine through international collaborations. By aligning Unani practices with contemporary science, the goal is to position Unani Medicine as a key player in addressing lifestyle disorders, chronic diseases, and public health crises on a global scale.



By K. Srinath Reddy



A HEALTH SYSTEM THAT TRULY CARES

The country must bolster its health system through increased public financing and unified federal-state efforts. Ensuring accessible, comprehensive care and financial protection will be crucial for sustainable development and global leadership

India became the world's most populous country in the 75th year after independence. As the nation moves to celebrate 100 years of post-colonial freedom in 2047, it aspires to be respected as a leader in the comity of nations, with the productive power of its vast and demographically young human resources propelling accelerated, equitable and environmentally sustainable global development. This casts a great responsibility on the country's health system to keep India's population healthy and productive as it ages.

Increase public financing: In a federal polity, where complementary constitutional roles of the central government for designing health policy and of states for delivering health services are clearly defined, this calls for the health systems across the country to be unified in objectives and aligned in operations. In order to deliver this mandate, the composite health system of India needs higher levels of public financing, with a minimum of 2.5 per cent of the country's growing GDP dedicated to health—a policy commitment oft-promised but yet to be delivered. This will help improve infrastructure from primary to tertiary care, train and deploy a larger and better skilled health workforce across the country, and ensure the assured provision of drugs and diagnostics wherever and whenever needed, while promoting research and development for finding innovative solutions to India's unresolved and emerging health challenges. An increase in health financing must come from both central and state budgets.

Our health system has to be anticipatory, recognising

THE GIANT STEPS

- India's health system has to be anticipatory, recognising changing determinants of population health
- The commitment to primary care-led universal health coverage requires strengthening of rural and urban primary health services
- For affordable service coverage, we need to draw upon a more responsive public sector, a more responsible private sector and a more resourceful voluntary sector

changing determinants of population health to gauge future trends in diseases and also be adaptive, responding with alacrity to unanticipated challenges when they arise. The Covid-19 pandemic of the recent past and the climate change conundrum of our imperilled future provide this message in bold letters. Even as we craft such a health system, we have an expansive agenda of action to address. Alongside infectious diseases like tuberculosis and still troubling manifestations of undernutrition in children and young women, we have a surge of non-communicable diseases, mental health disorders and overweight-obesity.

Strengthen primary care: India's commitment to primary care-led universal health coverage (UHC)—a target to be achieved by 2030—requires both rural and urban primary health services to

be strengthened. They must provide comprehensive and continuous care close to home, aided by point-of-care diagnostics, while being connected to more advanced healthcare facilities at secondary and tertiary levels through telehealth and emergency transport services. District and medical college hospitals must be upgraded to provide advanced care and also to serve as education and training hubs for medical and nursing students with allied health professionals of diverse categories.

Shortages in skilled health personnel are evident in all categories, with maldistribution across states and urban-rural divides exacerbating inequity. The needs of primary care can be addressed by training and deploying higher numbers of technology-enabled frontline workers (ASHAs, Auxiliary Nurse Midwives) whose upskilling can enable them to perform many

equity, urban design and transport. While promoting health and nutrition literacy in the population, it must shape public policies to curb aggressively advertised tobacco products, ultra-processed foods, sugar-sweetened beverages and alcohol.

India's large population is geographically, climatically, ethnically and culturally very diverse. The vast range of gene-environmental interactions, epigenetic changes and microbiome patterns in India can be studied to greatly enrich global science and fill gaps in our understanding of physical and mental health. Our pluralistic health systems can provide more complete responses to complex health problems through complementary approaches. Through frugal innovations and technological ingenuity, we can model new approaches to global health. ■

The author is Distinguished Professor of Public Health and past president, Public Health Foundation of India



functions currently assigned to doctors. Other categories of professionals too need to be trained in larger numbers, both to meet our health system needs and use our demographic advantage to supply a depleted global health workforce which is unable to serve ageing populations. We must promote our traditional systems of medicine, for integration into Indian and global health systems.

UHC has two measures: financial coverage and service coverage. Through adequate financial protection, we aim to reduce out-of-pocket and catastrophic expenditures (mostly related to outpatient care and hospitalisation respectively) and healthcare-induced impoverishment. But this becomes meaningful only when the healthcare that's needed is actually available and affordable. Therefore, India needs to cover gaps in both financial protection and service coverage. For affordable service coverage, we need to draw upon a more responsive public sector, a more responsible private sector and a more resourceful voluntary sector. Financial protection has to come predominantly from public sector provisioning and tax-funded government health insurance systems, with employer-provided and privately purchased health insurance playing a supplementary role.

A multi-sectoral approach: The health system must catalyse multi-sectoral policies that are aligned to public health goals—in spheres such as education, income security, nutrition-sensitive food and agriculture systems, environment, gender

THE PHARMACY TO THE WORLD

The future roadmap for the Indian pharmaceutical sector will hinge on R&D, innovation, sustainability and skills development, transitioning from 'Make in India' to 'Discover and Make in India for the World'

Our founder, the late Dr Anji Reddy, chose to call his memoirs *An Unfinished Agenda*—the unfinished part being the discovery, development and commercialisation of a new drug by Dr. Reddy's in his time. While our company initiated new drug discovery in 1992, the cost and risks of going beyond early-stage discovery were prohibitive to the young company. It was Dr Anji Reddy's dream to see Indian pharma successfully discover and take a pipeline of new molecules to the market and become an original innovation-driven industry.

Global manufacturing prowess: Today, India is the largest provider of generic drugs globally. Indian pharma supplies over 50 per cent of the global demand for various vaccines, 40 per cent of the generic demand in the US and 25 per cent of all medicines in the UK. Globally, India ranks third in terms of pharmaceutical production by volume and 14th by value. We built world-class capabilities in bulk drugs or API (Active Pharmaceutical Ingredients) in the mid-20th century, turning our attention to formulations and newer dosage forms in the 1990s, and entering new markets to break new frontiers



Illustration by SIDDHANT JUMDE



By Satish Reddy

internationally. We moved up the value chain in complexity from simple to complex molecules with higher entry barriers, cutting-edge technology platforms, devices, new chemical entities, biosimilars and biologics.

The Indian pharma industry is known as the 'pharmacy of the world' thanks to its manufacturing prowess, and stands for affordability, access, agility and quality. The growth story that started in the mid-20th century led to a powerful global leadership built in less than a single lifetime. This growth story has been a quiet one, still largely known to and discussed only among pharma and related circles. But it was the world-class strengths of this home-grown sector that stood us in good stead when Covid-19 hit the world. It brought India's leadership in pharmaceuticals manufacturing to show globally.

But if Indian pharma truly aspires to grow from its approximately \$50 billion (Rs 4.2 lakh crore, at the current exchange rate) worth today to around \$130 billion (Rs 10.9 lakh crore) by 2030, and perhaps \$400 billion (Rs 33.6 lakh crore) by 2047, the key would be innovation. Our industry has the ability to grow bigger not just in size and reach, but also grow deeper in terms of capability, complexity and innovation.

Becoming a discovery innovation hub: International trends show that research and development (R&D) and innovation are highly diffused, as innovator pharma companies increasingly source their portfolio from external partners. Interestingly, the share of the top 10 pharma companies in the global biopharma pipeline decreased

from 13.4 per cent in 2011 to just 4.1 per cent in 2023. It is platform biotech companies that are now producing new drugs at scale. Could there be potential for India to become a discovery innovation hub? We recently organised a roundtable conference with eminent names from government research institutes, academia and industry on 'Emerging Frameworks in Innovation' that resulted in a white paper on the same topic. There was consensus among all participants that such an innovation agenda starts with long-term vision and investment in innovative and science-driven R&D.

Discovery-based innovation involves risk. It entails the cost of technology, new capabilities, long gestation periods and a very high cost of failure. Such risk-taking can happen only within an enabling ecosystem. And this ecosystem will rest on the pillars of funding, enabling regulatory landscape, support for clinical trials, collaboration (government-industry-academia), and capability (talent, skilling). Funding will be one of the single biggest drivers of innovative R&D. Here, along with the pharma industry, there is an important role for other stakeholders—the government, regulators, academia, start-up and tech entrepreneurs, private funders, etc.

Innovation is more a mindset; it can come in many forms, including innovation for better access, new categories, new ways of doing business, deploying artificial intelligence and other technologies as enablers, and more. For example, in entering into a joint venture with Nestlé India, we are trying an innovative combined approach to bring health science nutraceuticals to consumers in India. Voluntary licences granted to Indian pharma companies during the Covid-19 pandemic are an example of 'open innovation' to ensure worldwide access to treatment solutions.

Building trust: I look forward to the future even as we ensure current healthcare needs are met. Patients around the world have come to trust and rely on Indian pharma, and we have a humbling responsibility towards them. As we plan the next phase of healthcare, we remain conscious of our status as a lifesaving industry. Patient safety and quality will always be our starting points. Alongside this, it is our responsibility to ensure our growth is environmentally sustainable, socially impactful and in keeping with the highest governance standards.

For Indian pharma, therefore, the future roadmap promises to centre on R&D, innovation, sustainability, upskilling and reskilling in its journey ahead from 'Make in India' to 'Discover and Make in India for the World'—from being a cost-based manufacturing powerhouse to becoming a value-based innovation powerhouse. ■

The author is Chairman, Dr. Reddy's Laboratories Ltd

THE GIANT STEPS

- The Indian pharma industry has the ability to grow bigger not just in size and reach, but also grow deeper in terms of capability, complexity and innovation
- Innovation can come in many forms, including innovation for better access, new categories, new ways of doing business, deploying AI and other technologies as enablers, and more
- Alongside patient safety and quality, the onus is on us to ensure our growth is environmentally sustainable



SPEARHEADING PHARMA INNOVATION

By prioritising value over volume, India's pharmaceutical industry can become a world leader in high-value exports and nearly triple its revenue by 2030, significantly impacting global healthcare

As the world's third-largest manufacturer of medicines by volume and the largest generics exporter, India has substantially impacted global healthcare. We provide cost-effective medicines to millions worldwide, with approximately 'one in three' pills consumed in the US and 'one in four' in the UK being produced in India. Our success in delivering accessible HIV treatment and low-cost vaccines has garnered international acclaim, earning India the well-deserved title of the 'Pharmacy of the World.' This success stems from our expertise in small- and large-molecule drug research and manufacturing, our ability to produce high-quality medicines at affordable prices, and our swift adaptation to global health crises, such as the Covid-19 pandemic.

The growth of India's pharmaceutical exports is impressive, increasing from ~\$19 billion (Rs 1.6 lakh crore, at the current exchange rate) in FY19 to ~\$28 billion (Rs 2.4 lakh crore) in FY24. However, India's 14th rank in terms of value highlights the potential to climb further up the value chain. To shift the sector from volume-based to value-based global leadership, it is crucial to grasp the potential that lies ahead for this industry.

The emerging opportunity: As non-communicable diseases like cancer and diabetes become major health challenges, biologics are emerging as the standard of care. Biologics, a crucial component of interventional medicines, are projected to comprise almost 40 per cent of all pharmaceutical spending by 2028 when global spending on medicines is expected to reach ~\$2.3 trillion (Rs 193 lakh crore).

Biosimilars are making these advanced biologic treatments affordable and accessible globally, potentially saving billions of dollars annually for health systems. Recognising the global need for cost-effective biologics early on, Biocon pioneered the biosimilars space in India, initially introducing insulins and subsequently expanding to developing

biosimilars for treating cancer and autoimmune diseases across the world.

Since its entry in the early 2000s, Biocon has commercialised eight biosimilars in global markets. Other Indian players who started with developing biosimilars for the domestic market have now started exploring the options to expand to global markets. With a large number of biologics coming off patent, it presents a good opportunity for Indian pharma players to invest in developing biosimilars for the global market, which is projected to rise by 2.5x from \$21 billion (Rs 1.8 lakh crore) in 2023 to \$56 billion (Rs 4.7 lakh crore) by 2030.

By serving unmet needs for affordable access to complex biologics, India's biosimilar players can replicate the success of the generics industry. Realising this vision will require large-scale research, development and manufacturing investments. It will also need government support in the form of infrastructure, funding and smart regulations.

Incentivising research & development: Developing and manufacturing biosimilars is complex and costly. Research-linked incentives can encourage the industry to boost R&D investments, offering higher incentives as products progress through development stages. The global pharmaceutical industry is projected to invest \$233 billion (Rs 19.6 lakh crore) in R&D by 2026. For India to become a global pharmaceutical innovation hub, substantial investments in R&D, manufacturing and digital transformation are essential. Thus, fiscal incentives for R&D are vital for success in the biosimilars sector.

The Indian government's recent decision to establish a Rs 1 lakh crore financing pool to spur private sector-driven research and innovation is a welcome step. The Promotion of Research and Innovation in Pharma MedTech Sector initiative is expected to foster a culture of innovation.



THE GIANT STEPS

By serving unmet needs for affordable access to complex biologics, India's biosimilar players can replicate the generics industry's success

The Indian pharmaceutical industry should adopt a unified standard of global excellence, ensuring "highest quality for all markets"

By leveraging AI, ML and Data Analytics, India can gain an edge in generics and biosimilars, and emerge as a global leader in innovative drug development and personalised medicine

Ensuring quality focus: The Indian pharmaceutical industry should adopt a unified standard of global excellence, ensuring the "highest quality for all markets". This commitment to universal quality will not only strengthen global trust in Indian pharmaceuticals but also reinforce the ethical responsibility to provide safe and effective medicines to everyone. To improve quality standards and compliance, the government has recently notified the revised rules under Schedule M of the Drugs and Cosmetics Rules, prescribing the Good Manufacturing Practices for pharmaceutical products and introducing a stronger quality system for all drug products.

Encouraging digital transformation: Artificial Intelligence (AI), Machine Learning (ML) and Data Analytics are

revolutionising drug discovery, development, manufacturing and distribution. By leveraging these technologies, India can not only gain an edge in generics and biosimilars but also emerge as a global leader in innovative drug development and personalised medicine. To encourage corporate investment in Industry 4.0 tools, the government should consider incentives such as weighted deductions on digital transformation spending or GST exemptions.

Boosting infrastructure development: A robust infrastructure is vital for a competitive pharmaceutical industry. Policy tools like the Production Linked Incentive (PLI) scheme, offering fiscal incentives for production capacity and technology upgrades, can help transform India into a global bio-manufacturing hub. The PLI scheme for medical devices is already narrowing the export-import gap.

Strategic shift: While the journey is challenging, the Indian pharmaceutical industry has the potential to become a global leader in high-value pharmaceutical exports with the right strategies and policies. By embracing value-addition over volume, the industry can achieve its ambitious target of \$130 billion (Rs 10.9 lakh crore) by 2030, nearly tripling from the current \$50 billion (Rs 4.2 lakh crore). This strategic shift will not only enhance India's global standing but also make a significant contribution to global healthcare. ■

The author is Executive Chairperson, Biocon and Biocon Biologics



An **IMPACT** Presentation

WEAVING PROSPERITY

India's Textile Industry on the Path to Viksit Bharat



The Garden of TOMORROW

A new thread in the fabric of our country. A new start to the journey of a fashion icon in the Textile Industry. Fueled by cutting-edge science, revolutionary technology, and new-age sustainability, we present
The Garden of Tomorrow.

Brought to you by Garden Silk Mills Pvt. Ltd., this marks a new chapter in the Garden Vareli legacy where evergreen fashion fabrics weave a saga of timeless elegance.

Come discover the limitless budding possibilities in the Garden of Tomorrow.

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CELEBRATING GUJARAT'S RICH CRAFT HERITAGE

For half a century, Gujarat State Handloom & Handicrafts Development Corporation Ltd. (GSHHDC) has been working for the revival, development, and promotion of Gujarat's rich handloom and handicraft tradition. Established in 1973, GSHHDC, an undertaking of the Government of Gujarat, has worked tirelessly to bring the exquisite crafts of Gujarat to a wider audience, ensuring their relevance in the modern era while preserving their historical essence.



Honorable Prime Minister Narendra Modi during 'Khadi Utsav' in Ahmedabad.



Picture: Sankheda Furniture of Chhota Udepur, Gujarat



Bead Work



Dhablia Handloom Weaving



Agate Coaster

VISION AND MISSION

GSHHDC's vision encompasses crafts identification, revival, development, promotion, and marketing of Gujarat's rich handloom and handicraft tradition. This is achieved through:

Organizing Exhibitions and Tribal Melas: GSHHDC organizes exhibitions and tribal melas to sell and raise awareness about Gujarat's handloom, handicrafts, and tribal crafts among potential buyers. This includes organizing exhibitions at premium event venues such as IITF (Pragati Maidan), Surajkund Crafts Mela, Bharat tex (Yashobhoomi Dwarka), & premium institutions such as IIM Ahmedabad, NIFT, IIT-Gandhinagar, & DAIICT.

Ensuring Marketing Support: GSHHDC provides comprehensive marketing support to artisans and weavers by procuring and selling their products through GSHHDC's extensive Garvi-Gurjari emporiums.

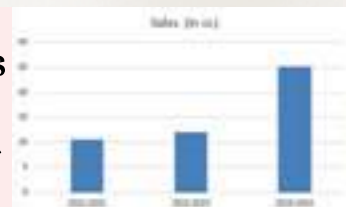
Providing Design Development Support and Quality Raw Materials: GSHHDC assists artisans and weavers in design development, sourcing quality raw materials, and creating new, value-added products that meet contemporary market demands.

Generating Employment and Sustainable Income:

GSHHDC creates sustainable employment opportunities and stable income for rural artisans and weavers.

Implementation of Government Schemes: GSHHDC actively implements the Government of India and the Government of Gujarat schemes to support and benefit artisans and weavers.

Achievements A Record Breaking Year



In the financial year 2023-24, GSHHDC achieved its highest sales in 50 years, reaching Rs. 2,520.44 lakhs. The corporation organized over 60 exhibitions, benefiting around 3,997 artisans under the exhibition scheme and supporting 7,287 artisans through direct procurement of Rs. 1,475.93 lakhs.

COLLABORATION WITH NIFT



GSHHDC has partnered with the National Institute of Fashion Technology (NIFT) through a Memorandum of Understanding (MoU). This collaboration is aimed at leveraging the strengths of both institutions to foster national and international craft promotion with an objective of expertise utilization, knowledge & resource sharing, & artisan training.

'VASHUDHAJAN,' a design collection curated by NIFT Gandhinagar and Garvi Gurjari, was showcased at the G20 Summit to establish a solid framework for supporting artisans, elevating their crafts, and ensuring their work achieves visibility in both national and international markets.

COLLABORATION WITH NID



In a strategic initiative, GSHHDC partnered with the National Institute of Design (NID) to craft new uniforms for its emporium staff, celebrating Gujarat's rich craft heritage. Designed by NID, these uniforms highlight the state's traditional craftsmanship and cultural elements, enhancing the overall customer experience.

Inspired by the UNESCO World Heritage Site Rani Ki Vav, the uniforms feature geometric shapes, floral motifs, and Ajrakh craft, representing harmony, unity, and natural beauty. This design ensures a professional look for staff & captures the essence of Gujarat, providing visitors with a unique and immersive experience.

Unveiled on National Handloom Day, these uniforms are set to improve store ambience and promote Gujarat's distinctive craft tradition.



“

As GSHHDC celebrates five decades of excellence, its commitment to preserving and promoting Gujarat's handloom and handicrafts heritage remains strong. Through its visionary initiatives, Garvi Gurjari continues to empower artisans, foster innovation, and bring the timeless beauty of Gujarat's crafts to the world stage.

”



SCAN ME

Shop Online:
Garvigurjari.gujarat.gov.in

EXHIBITIONS: BRINGING ARTISANS TO THE FOREFRONT

Garvi Gurjari organizes numerous exhibitions, providing artisans a platform to sell their products directly to customers. These events typically feature 50-70 artisans and are held in prime locations, including those organized by the central government and international exhibitors, allowing artisans to showcase Gujarat's rich heritage to a global audience.



AWARDEE ARTISANS

GSHHDC takes immense pride in its association with numerous award-winning artisans, including National Awardees, Padma Shri recipients, and State Awardees, who contribute to the rich tapestry of Gujarat's handloom and handicraft traditions. The Sant Kabir Award (Weaving), National Award, Shilp Guru Award, and National Merit Certificate are among the honors that fall under the handloom and handicraft categories.

ODOP SCHEME: STRENGTHENING HANDLOOM AND HANDICRAFTS

The recently introduced ODOP (One District One Product) scheme aims to identify and strengthen unique products from each of Gujarat's 33 districts. This initiative underscores GSHHDC's commitment in further strengthening the handloom and handicraft sector in Gujarat.



Gaffur Bhai:
Rogan Artisan

Paresh Bhai:
Pithora Artisan

Bhanu Bhai:
Mata Ni Pachedi Artisan

ERP SYSTEM

Embracing technological advancements, GSHHDC has implemented an ERP (*Enterprise Resource Planning*) system across its emporiums, TCPC (*Training cum Procurement Centers*) and head office. This system ensures smooth functioning, enhancing operational efficiency.

G20 & VIBRANT GUJARAT

GSHHDC has actively participated in prestigious events such as the G20 summit and Vibrant Gujarat summit. Through these platforms, Garvi Gurjari has showcased its handloom and handicraft products to national and international delegates. Additionally, GSHHDC was the preferred gifting partner during these major events, further promoting Gujarat's cultural heritage.



MATA NI PACHEDI THE SACRED CLOTH OF THE GODDESS

In accordance with the government's initiative, a comprehensive description of Mata Ni Pachedi was published on the Hastkala Setu Yojana website. For more information, please scan the QR code.



Scan and discover the rich heritage and artistry of this traditional art form.

EMPOWERING ARTISANS: THE GARVI GURJARI WAY

Garvi Gurjari extends support to Gujarat's artisans through various schemes, exhibitions, and marketing strategies. This includes marketing platform through its network of Garvi Gurjari emporiums, design development workshops, skills upgradation programs, and Common Facility Centre's (CFCs).

Training and Modernization: Artisans receive doorstep training to produce market-appropriate products. Our skilled designers from NIFT and NID help artisans meet current market demands.

Supply of Raw Materials: Quality raw materials are procured and supplied to artisans, ensuring they can produce high-quality products.

Rebates and Discounts: To boost sales, a 5% rebate is offered year-round, making handicraft products more competitive in the market. Additionally, the corporation offers an extra 10% discount for 120 days during the festival season.

Common Facility Centres (CFCs): CFCs include testing labs, design development, and training centers, and raw material banks to support artisans comprehensively.

Toolkit Distribution and Educational Tours: Advanced toolkits are distributed, and educational tours are organized to broaden artisans' knowledge and expose them to markets outside their home state.

Publicity and Advertisement:

Extensive advertising campaigns across digital and non-digital media to create awareness and drive sales.



GARVI GURJARI SHOWROOMS: SHOWCASING GUJARAT'S HERITAGE



SCAN ME



Scan and check your nearest Garvi Gurjari Showroom



Garvi Gurjari's network of showrooms across India, in cities like Delhi, Kolkata, Hyderabad, Bengaluru, and Chennai, plays a pivotal role in preserving and promoting traditional crafts. Recent expansions include new showrooms at Udaipur and Vadodara airport, with plans for future growth at Varanasi, Rajkot, Junagadh, & Dwarka. These emporia serve as cultural beacons, offering a glimpse into Gujarat's vibrant art & craft tradition.

Weaving Prosperity: The Role of Textiles in India's Journey to Viksit Bharat

India's textile industry is more than just a link to the past; it's a living, breathing force pushing the country towards a more flourishing and a brighter future. Rooted in tradition but looking firmly ahead, this sector not only keeps Indian craftsmanship alive but also plays a big role in boosting the economy.

Handloom and handicrafts are key segments of the textile industry, keeping India's cultural roots strong while giving the country a competitive edge globally. The handloom sector, with over 4.5 million weavers and workers, is the second-largest source of rural jobs after farming. It produces about 15% of the country's fabric, helping millions of families make ends meet. From the intricate designs of Chanderi to the vibrant colours of Phulkari, Indian artistry shines through. Meanwhile, the handicraft industry supports over 7 million artisans, most of them women, making it essential for economic empowerment and cultural preservation.

Recognising this potential, the government has rolled out several programmes to support and grow these industries. The National Handloom Development Programme (NHDP) is a prime example, helping to improve productivity and quality while ensuring weavers can make a decent living. This programme, along with the Yarn Supply Scheme, provides financial backing to handloom clusters, helping them modernise and tap into new markets. In order to attract private equity and employee more people, the government introduced various schemes such as the Scheme for Integrated Textile Parks (SITP), Technology Upgradation Fund Scheme (TUFS) and Mega Integrated Textile Region and Apparel (MITRA) Park scheme.

India's textile industry is a powerhouse, with a projected market growth from \$138 billion to \$195 billion by 2025. As the world's largest cotton producer, India is set to produce 7.2 million tonnes of cotton by 2030, fueling a \$30 billion market. The Indian Technical Textile sector, with a 10% growth potential, and the composites market, poised to reach \$1.9 billion by 2026, reflect India's expanding influence. In FY24, textile exports, including handicrafts, reached \$35.9 billion, with the U.S. accounting for 32.7% of this value. The industry employs 4.5 crore workers, sustaining India's legacy in textiles (Source: IBEF).

The market expansion is driven by improved online accessibility and a surge in tourism, which boosts demand for souvenirs and supports local artisans.

Technology is also playing a big role in this success. In places like Varanasi, where the Banarasi saree has been a beloved tradition for generations, artisans are now using digital platforms to reach overseas customers. E-commerce initiatives backed by the government have turned local crafts into international businesses.

State governments are getting into action too. Take Gujarat, for instance—a state with a rich textile history. Its investments in fairs, exhibitions, and trade missions have put its handloom

and handicraft products on the global map. But it's not just the government driving this resurgence. Private companies have seen the value in traditional crafts, not just as cultural treasures but as business opportunities. Brands like Garden Vareli, Fabindia, and Raymond have helped bring Indian textiles to the world stage. Garden Vareli, for example, is known for its high-quality sarees, blending traditional designs with modern flair, and keeping India's textile heritage alive and thriving.

Sustainability is another big focus. With the world increasingly leaning towards eco-friendly products, Indian handloom and handicraft items—famous for their natural dyes and organic materials—are finding new fans globally. This trend not only boosts the appeal of Indian products but also helps protect the environment.

As India works towards becoming a developed nation, its textile industry with its deep roots in both tradition and modernity, shows how ancient wisdom can fuel modern growth. With a mix of government support, private sector innovation, and global appreciation for hand-made goods, this industry is becoming a cultural and economic powerhouse. Each piece of handcrafted work tells an inspiring story of creativity, and the vibrant energy that's shaping a prosperous and diverse future.



EPCH
Export Promotion Council
for Handicrafts
Empowering, Inspiring, Transforming

EPCH AIMS AT TRIPLING HANDICRAFTS EXPORTS BY 2030

Teen Guna Tees Tak!

Excellence is the hallmark of EPCH, New Delhi, which has a membership of Handicraft exporter of around 10,000 from PAN India.

The apex organisation focuses on improving infrastructure, marketing and information to support Indian handicraft to achieve its ambitious handicrafts export target of 'Teen Guna Tees Tak' - Tripling Exports by 2030. Emphasis is on emerging trends and design intervention in product development, packaging innovation, brand building, enhance productivity, quality and standards, sustainable development, and compliances, offering Indian handicrafts a level playing field in a sharply competitive global market.

One of EPCH's flagship initiatives include organizing international trade fairs and exhibitions. The Indian Handicrafts and Gifts Fair (IHGF Delhi Fair), a biannual, is among the world's largest and most prestigious trade fairs, which attracts over 3,000 Indian exhibitors and thousands of international trade buyers and visitors from across the globe. IHGF is recognised by Limca Book of Records as the largest congregation of handicrafts exporters under one roof. EPCH also participates in

more than 30 major international fairs for showcasing India's indigenous handicrafts. The EPCH's commitment can be gauged from the handicrafts exports during FY 2023-24, which stood at a whopping Rs. 32,759 Crores and US \$ 3,956 million!

The Council has regional offices in Agra, Bangalore, Guwahati, Jaipur, Jodhpur, Kolkata, Moradabad, Mumbai, Saharanpur and Narsapur. EPCH has been instrumental in setting up State of the Art exhibition complex i.e. India Expo Centre & Mart at Greater Noida, Delhi -NCR. EPCH has Common Facility Centre at Saharanpur, Resource Centre at Moradabad and Trade Facilitation Centre at Jodhpur. The International Lace Trade Centre with dyeing facility at Narsapur (Andhra Pradesh), the Handicraft Productivity Centre at Jaipur, with a Wood testing lab, and the Pashmina Certification Centre at Dehradun set-up in collaboration with Wildlife Institute of India (WII), Dehradun, are among EPCH's path-breaking efforts. EPCH developed Vriksh, Indian timber legality, assessment and verification standards and shipment certifications for facilitating exports of wooden handicrafts made

of Dalbergia sisoo and Dalbergia latifolia and is acceptable by 184 CITES, signatory countries. The scheme is confirmed to 10 Sustainable Development Goals (SDGs) of UNFCC.

Entrepreneurs have access to various training and capacity building programmes run by the Council in the areas of compliance, policy interventions, packaging, marketing strategies, design trends and forecast. Providing a comprehensive and integrated approach to build an enabling and transformative ecosystem, initiatives such as the EPCH Design connect portal, Design Clinic services EPCH Design Register, Handicrafts & Carpet Sector Skill Council (HCSSC), and EPCH Centre for Handicrafts Exports Management Studies (CHEMS), are among the sustainable and consistent initiatives in the last 4 decades to empower export capabilities and global acceptability of products of Indian artisans and entrepreneurs.

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GRAINS OF CHANGE



HEAVY HITTER
 Stacked gunny bags of millet at a grains depot in Bengaluru

Photograph by AFP

THE SEEDS OF A REVOLUTION

Horticulture, raised in a third of our cultivable area, already surpasses foodgrains in production. Now it strives to be the game-changer in agri exports

By **Amarnath K. Menon**

India ranks second globally, after China, in horticulture production now, but still has phenomenal potential to grow as the fresh fruits and vegetable basket for the world. In 2023-24, the country produced 112.6 million tonnes (MT) of fruits and 205 MT of vegetables. We already lead in the production of banana, mango and papaya among fruits, and onion, ginger and okra among vegetables. The problem is in exports. In 2023-24, we exported fresh fruits and vegetables worth \$1.8 billion (Rs 15,039 crore), and processed fruits and vegetables (including pulses) worth \$2.5 billion (Rs 20,623 crore), says the Agricultural & Processed Food Products Export Development Authority (APEDA). But India's share in the global horticulture produce market is still a measly 1.1 per cent. Initiatives to create state-of-the-art cold chain infrastructure and quality assurance measures are on, but there is still a long way to go. "Farmers play an essential role in our lives, but their needs are not a priority. They do not have an export market for produce and have been reduced to mere vote banks," says P. Chengal Reddy, farm reforms campaigner and secretary-general, Confederation of Indian Farmers Associations, emphasising that horticulture exports can be a catalyst in transforming lives.

Horticulture is already a significant player in agricultural growth, contributing 30.4 per cent to the agriculture gross domestic product (GDP) while using only 13.1 per cent of the gross cropped area. It also contributes about 33 per cent to the agriculture GVA (gross value added), making a significant contribution to the Indian economy. Indeed, if the area under horticulture cultivation goes up by 50 per cent, it could by itself deliver on the long-promised 'doubling of farmers' incomes'. India has also emerged as the fifth largest country in terms of organic agricultural area—2.3 million acres—and is also home to the world's largest number of organic farmers.

By 2026, the overall organic farming industry is anticipated to be worth \$10.1 billion (Rs 84,797 lakh crore), according to agriculture ministry estimates.

UNTAPPED POTENTIAL

Apart from the large investments by the private sector in horticulture, APEDA has set up several facilities for perishable cargo and integrated post-harvest handling. Capacity-building initiatives at the farmer, processor and exporter levels are also taking place. A big advantage for India is its unique eight agro climatic zones, which ensure the availability of a wide variety of fruits and vegetables throughout the year. In 2023-24, fruit cultivation was taking on 7 million hectares, while vegetables were being harvested on 11 mha. Horticulture surpassed foodgrains in production per hectare in 2011-12 and stood at 12.5 tonnes per hectare in 2021-22 as against 2.2 tonnes for foodgrains. Not only this, horticulture creates higher incomes for farmers and more job opportunities for farm labour in rural areas (a hectare of fruit production generates 860 man-days of work a year as against 143 man-days with cereal crops).

Export growth in the horticulture sector is undermined by production and marketing challenges, inadequate transport infrastructure, fragmented supply chains and insufficient storage facilities. So becoming globally competitive is one of India's biggest challenges. Domestically, horticulture's penetration and spread are steadily rising. Small and marginal farmers (those with less than 2 hectares), who account for 86.2 per cent of those involved in horticulture, have taken to it in many areas as there is high demand for their produce. Rising incomes, urbanisation and the apparently contradictory trends of improved health awareness and higher consumption have all been contributing factors. A number of government initiatives like agri export zones and GrapeNet have also helped in horticulture's growth.

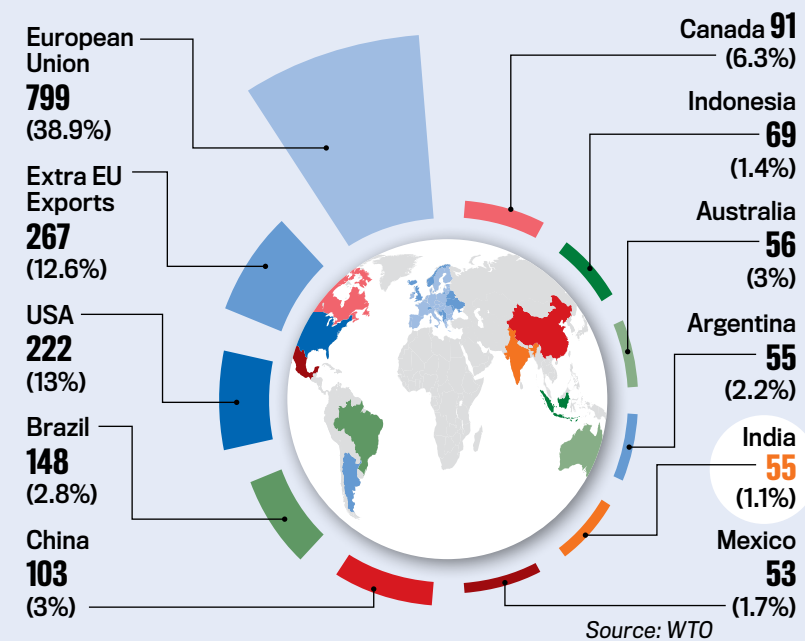
But small operational holdings are also among the many

REACHING FOR THE HIGH-HANGING FRUIT

India is among the top 10 exporters of agri produce, horticulture could help it hit the top tier

TOP 10 EXPORTERS OF AGRICULTURAL PRODUCTS

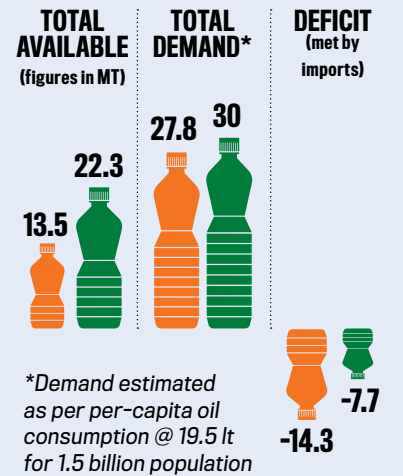
Value in \$ bn and %age of world share



SLIPPERY SLOPE

Edible oil production has not kept up with demand, but the gap is narrowing

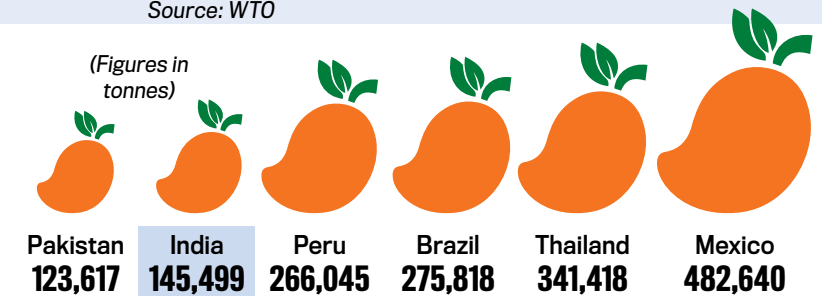
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AT AAM'S LENGTH

Exports of four tropical fruits—mango, pineapple, avocado and papaya—are growing globally. India has significant exports only in the king of fruits, mango, where it is No. 5 in the world

Source: Major Tropical Fruits Market Review, 2023, FAO



production challenges (they can't scale up), along with lack of proper irrigation and poor soil management. Limited land availability also affects crop rotation and the use of sustainable agricultural practices, as small farmers may not have the space or the wherewithal to implement these successfully. Therefore, smallholders will have to be formed into groups and recommended specific crops in order to create an advantage. Inadequate availability of quality planting material is also a factor for the low productivity of various horticulture crops, according to the National Horticultural Board. That said, precision farming methods, including the latest agronomic knowledge and sustainable farming techniques, integrated pest management, and responsible use of crop protection products, can boost yields and maintain quality while minimising environmental impact.

The limited reach of farm insurance and farm mechanisation, combined with a lack of access to institutional credit

IF THE AREA UNDER HORTICULTURE CULTIVATION GOES UP BY 50 PER CENT, IT ALONE COULD DELIVER ON THE MUCH PROMISED DOUBLING OF FARMERS' INCOMES

for small and marginal farmers, currently contribute to lower investment in the sector. To ensure the flow of adequate credit, the government sets annual targets for it. But even so, nearly 30 per cent of agricultural households still avail credit from non-institutional sources, according to the National Bank for Agriculture and Rural Development (NABARD).

Yet another constraint for horticulture is the weak farmer-producer organisation (FPOs) network. FPOs can enable economies of scale, enhance operational efficiencies, promote best practices, connect farmers with (international) buyers, secure fair prices, minimise the impact of intermediaries, and build farmers' capacity to manage modern agriculture's complexities. However, their weaknesses contribute to horticulture's challenges, limiting the farmers' ability to benefit from opportunities. Recognising the need to increase the bargaining power of farmers, the government is implementing an FPO formation and promotion scheme, with an outlay of Rs 6,300 crore. Around 8,000 FPOs have been formed so far. Besides establishing crop-specific value chains, the FPOs will also focus on agri-entrepreneurship development and mentoring farmers in producing quality goods that meet global standards.

Horticulture has never had it so good, especially since it is in sync with the government's vision for agriculture in the future. A number of schemes have been launched to ensure its success, such as the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) to improve irrigation and reduce water waste; the Cluster Development Programmes (CDP) to get smallholders together, assist in pre-production, post-harvest logistics, branding and other issues; and the Paramparagat Krishi Vikas Yojana (PKVY) to encourage cluster-based organic farming with accreditation (training and certification). Then there's the comprehensive crop insurance coverage—from pre-sowing to post-harvest losses—with the Pradhan Mantri Fasal Bima Yojana, and Soil Health Cards to promote soil health. The Model Agricultural Land Leasing Act, 2016 has also helped legalise leasing and given tenants access to insurance and credit.

MARKETING LINKAGES

Horticulture export is risky because of the perishable nature of the produce. The export journey typically involves handling by multiple parties: farmers, logistics operators, customs authorities, phytosanitary (plant health and disease) inspection agencies, repackaging providers and more. This has to be undertaken in a fast, coordinated manner to ensure fresh delivery to the retailer. Poor logistics and lack of equitable cold storage and warehousing facilities contribute to delays and wastages. Existing cold storage distribution among the states is also inequitable, with nearly three-fifths of the total storage capacity (21 MT) confined to the four states of Uttar Pradesh, West Bengal, Gujarat and Punjab, and most of it only for the potato crop. Enhanced cold storage capacity, but one which is more spread out, will enable farmers to adjust the supply based on demand fluctuations—a crucial advantage while exporting. That said, it must also be noted that capacity utilisation at processing facilities in the country is barely 30 per cent now. This is perhaps because marketing is our weakest link. "We produce 28 million tonnes of mangoes but do not export even a tenth of it a year," says Chengal Reddy.

TAKEAWAYS

- ▶ **India is No. 2 globally in horticulture production but its share in global exports is still a measly 1.1%**
- ▶ **Horticulture contributes 30.4% to the agriculture GDP**
- ▶ **Smallholders make up 86.2% of horticulturists. It's a boon and bane—livelihood for many, but scaling up is difficult**
- ▶ **Horticulture has the Centre's backing, many schemes tailored for it now**
- ▶ **Farmers still wary of horticulture, feel it's risky compared to MSP surety of grains**
- ▶ **Marketing needs total revamp in food processing; demand slow, units working at 30% capacity**

FOOD PROCESSING

For value addition, processing and export, it is integral to appreciate what the farmer, industry and exporter want and make it accessible and available. The ministry of food processing has launched several schemes aimed at promoting the industry, including the creation of cold chain infrastructure, agro processing clusters, backward and forward linkages, preservation infrastructure, Operation Greens (integrated value chain development projects) and mega food parks. These schemes provide various facilities to food processing units, such as storage, testing labs and logistics while also stabilising the supply and prices of perishable commodities. Processing of fruits and vegetables can also be done by the One District One Product model, leveraging the strengths of region-specific produce to expand the export basket.

The diversity in Indian agriculture is mind-boggling with the amazing range of crops and agro-climatic conditions in which they are grown. But right now, there is no entity to give it direction from a national perspective like in the industry and services sectors. Says K.R. Suresh Reddy, Bharat Rashtra Samithi leader in the Rajya Sabha and MPs' Forum for Farmers convener, "We need a mechanism, like in the US and Australia, where farmers' bureaus and farm councils assist growers, ensure they get a fair deal. Such a commission must focus entirely on farmers' issues... they are now being handled by several departments and ministries." A National Agriculture Advisory Council, comprising all stakeholders, could be the answer. To mark new beginnings and spur exports, it could maybe even declare the mango, often referred to as the king of fruits, as the fruit ambassador of India. ■

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Cultivating Excellence

NFL's Journey in transforming Indian Fertilizer Sector

In the ever-evolving landscape of the fertilizer industry, **Dr. U. Saravanan** stands as a beacon of innovation and resilience. As the Chairman and Managing Director (CMD) of National Fertilizers Limited (NFL), he has steered the company through unprecedented challenges to achieve record-breaking success including achieving Navratna Status to NFL. With a focus on sustainability, community development, and operational excellence and vision of being a leading Indian company in fertilizers and beyond, NFL has navigated through significant challenges achieving remarkable growth and innovation. In this exclusive Q&A, Dr. U. Saravanan unfolds the strategic brilliance behind NFL's initiatives, outlining the transformative path that will shape the future of Indian Fertilizer industry.



DR. U. SARAVANAN
Chairman and Managing Director (CMD)
National Fertilizers Limited (NFL)



■ **Dr. Saravanan, could you share with us your journey since your appointment as Chairman & Managing Director of NFL?**
I was appointed as the Chairman & Managing Director of National Fertilizers Limited (NFL) effective from June 16, 2023. During my tenure at

NFL, the Company has reached a significant milestone, as it has been honoured with the prestigious Navratna Status by the Government of India.

When I first joined this esteemed company, I had a vision of turning the company in to a Navratna PSU from a Miniratna PSU. Today, I am glad to see that the same vision has materialized into reality.

My tenure at NFL had been marked with significant challenges and transformative initiatives, but our team's dedication and strategic initiatives have led us to excellent results.

■ **Please highlight NFL's contribution in the agriculture growth of the Nation?**

NFL has always been a cornerstone of the Indian agriculture since green revolution. The company is commemorating 50 glorious years of its existence on August 23, 2024. For the past five decades since 1974, NFL has been dedicatedly serving farmers and making pivotal contributions in the agricultural development of the nation, thereby fostering self-sufficiency in food production.

■ **Could you elaborate on the challenges NFL faced in the last few years and how the company navigated through them?**

The recent years have been exceptionally challenging for the Indian fertilizer industry, largely due to the geopolitical conflict between Russia and Ukraine. This conflict severely disrupted the supply chain, causing a significant spike in the prices of fertilizers and raw materials, and escalating production costs due to high energy prices. Despite these hurdles, the Indian government acted

proactively to facilitate both production and import of fertilizers.

At NFL, we have leveraged our robust operational efficiency, strong marketing network and strategic diversification into Non-Urea segments, to mitigate these challenges. Our expansion of marketing territories and energy-efficient operations led us to an unprecedented performance in production and sales.

■ **Could you provide more details about NFL's manufacturing plants and their capacities?**

NFL operates five gas-based Ammonia-Urea plants located in Nangal and Bathinda in Punjab, Panipat in Haryana, and two plants in Vijaiapur, Dist. Guna Madhya Pradesh. Together, these plants have an annual installed capacity of 35.68 LMT, making NFL the second-largest Urea producer in India and largest Urea producer among PSUs, with a 16% share of the country's total Urea production.

We have a Bio-Fertilizers Plant at Vijaiapur, with a capacity of producing 600 tons of solid and liquid Bio-Fertilizers and a 25,000 MT Bentonite Sulphur plant in Panipat. The company also produces Industrial Products viz. Nitric Acid, Ammonium Nitrate and Sodium Nitrate at its Nangal Plant. Additionally, we have 3 Seed Processing Units at Bathinda, Panipat and Indore and our agrochemical manufacturing unit is based at Bathinda.

Further, we are also coming up with our own Nano Urea plant at NFL Nangal Unit and Gold Urea plant at NFL Panipat Unit.



■ **How has NFL contributed to the community under your leadership?**

The Company is consistently working towards areas like healthcare, children's education, women empowerment, provision of clean drinking water, rural development, sanitation, skill development etc under its CSR.

In the last few years, we have kept our focus on 'Health & Nutrition' under CSR Initiatives. We undertook projects for improving nutrition & health of the Government school children, provided ALS Ambulances & Medical Equipments to Government hospitals, organized health camps for the wellbeing of people living in the vicinity of our Plants, provided assistive aids & devices to differently abled persons to support their life & livelihood and promoted menstrual hygiene awareness among the rural women.

Furthermore, with a focus on empowering women, we have provided 70 Agricultural Drones to women beneficiaries from Women Self-Help Groups in Punjab and Madhya Pradesh under the NAMO Drone Didi scheme. This signifies our dedication towards creating livelihood opportunities and fostering economic independence among women in rural areas.

■ **Dr. Saravanan, could you elaborate on the marketing efforts of NFL?**

In the Financial Year 2023-24, we registered the highest-ever fertilizer sales of 69.73 LMT in comparison to 66.72 LMT achieved in the previous year.

One of our primary focuses has been to develop marketing strategies, which ensure that our products reach every corner of the country efficiently. NFL's marketing network is very extensive, comprising a Central Marketing Office in Noida, 4 Zonal Offices, 21 State and 3 Union Territory Offices and 43 Area offices.

We are continuously expanding our marketing territories across the nation to extend our reach to new customers, particularly in south India to further solidify our foothold in the region. This strategic move will help in enhancing our profitability and turnover, thereby fortifying our position in the market against competitors. Our marketing efforts are not just limited to

sales but also encompass, educating farmers on sustainable and efficient agricultural practices. We regularly organize training programs for farmers to promote the use of balanced fertilizers and soil testing facilities and modern agricultural practices with the help of our vast marketing network.

■ **What were some of the key initiatives and innovations undertaken by NFL during this period?**

Recently, the Company held agriculture drone demonstrations during the Viksit Bharat Sankalp Yatra across various states to showcase the benefits of drone technology and raising awareness among farmers. These agricultural drones are proving to be an effective and efficient method for broadcasting liquid fertilizers in crops, thus significantly reducing labor costs in farming.

In addition, we have also converted around 12000 fertilizer shops into Pradhan Mantri Kisan Samruddhi Kendras (PMKSKs), providing farmers with a one-stop solution for all their agricultural needs, including soil testing and advisory services. This initiative has been instrumental in strengthening our direct engagement with the farming community and ensuring timely supply of inputs.

■ **What is the Vision and Mission of NFL, and how do you plan to achieve them in the coming years?**

NFL's Vision is "to be a leading Indian company in fertilizers and beyond with



commitment to all stakeholders," and our Mission is "to serve the farming community and other customers to their satisfaction through timely supply of fertilizers and other products & services; continually striving to achieve the highest standards in quality, safety, ethics, professionalism, energy conservation with a concern for ecology and maximizing returns to stakeholders."

TO ACHIEVE THESE GOALS, WE ARE FOCUSING ON SEVERAL KEY AREAS:

1. **Expansion and Diversification:** Go global is our mantra now. We aim to expand our product range and geographical reach, including equity or funding related assist for starting trading wing in abroad.
2. **Operational Efficiency:** Continuous improvement in operational efficiency through technological advancements and energy-saving measures.
3. **Sustainability:** Enhancing our environmental sustainability initiatives to reduce our carbon footprint and promote green practices.
4. **Community Development:** Strengthening our CSR initiatives to contribute to the socio-economic development of communities around our plants and marketing territories.

Dr. U. Saravanan's unwavering dedication and visionary leadership have not only propelled NFL to new heights but also set a benchmark for excellence in the industry. His strategic foresight and commitment to innovation have ensured that the company remains resilient and prosperous even in challenging times. As NFL continues to flourish under his guidance, there is no doubt that the future holds even greater achievements and contributions to India's agricultural sector.





Illustration by SIDDHANT JUMDE

FOCUS ON HIGH VALUE AGRI

Achieving 'Green Revolution-plus' through horticulture alongside productivity boosts in our staples is key to the 'Viksit Bharat' strategy



By Ashok Dalwai

India, with an agriculture output of over 1,300 million tonnes (MT) in 2023-24, is food secure. However, nutritional deficiency, low farmer incomes and ecological unsustainability continue to remain our bane. The country's historically pluralistic platter of agri produce is challenged by an agricultural management that prefers specialisation over diversification. Crop diversification involves practising a range of agricultural/ cropping systems to meet society's demands, aligned with the location's agro-ecology and national priorities. In 2018, the Committee on Doubling Farmers' Income (DFI) submitted its report

to the government, which recommended that they adopt high-value agriculture (HVA), including horticulture, animal husbandry and fisheries. In 2015-16, horticulture, with just 7 per cent of the net cultivated area, contributed 25 per cent to the agricultural GVA (gross value added).

India's 'Viksit Bharat' strategy requires a regular emphasis on agriculture. The Green Revolution provided basic food security, 'Harvesting Horticulture' can now target nutritional and income security, leading to a Green Revolution-plus or GR-plus. This strategy offers essential micronutrients, engages more manpower on the farms and processing fac-

ories, enhances agricultural household purchasing power, stimulates the rural economy, and aids climate change mitigation. Horticulture, which encompasses fruits, vegetables, flowers, plantations, spices and medicinal plants, has been a key diversification domain since the 1980s. In 2023-24, horticulture output was 359 MT from around 28 million hectares, exceeding the foodgrains output of 329 MT. Research shows that small and marginal farmers benefit more from diversification into fruits and vegetables, particularly the latter. A National Sample Survey Office (NSSO) survey revealed that additional income due to an area shift to horticulture was as high as Rs 69,129 per ha. in 2012-13. This shows that diversification towards horticulture can result in higher incomes for farmers.

Potential in horticulture:

Horticultural crops genetically have more potential than the agronomic, and can yield over 30 tonnes per hectare. Current productivity averages are low, indicating growth potential through genetic improvement and better cultivation practices. Among these:

- **Water usage:** Fruits, vegetables, flowers and some spices are high water-demand crops. Practices like micro-irrigation boost productivity (25-50 per cent) and save water
- **Food loss and waste:** Minimising food losses (4.5-15.9 per cent) through strengthened agriculture logistics and processing is crucial. This will also help in transferring greater income to the farmers
- **Market access and trade:** Efficient marketing and transparent price discovery mechanisms are needed. Enhancing agri-logistics and cold storage infrastructure is vital
- **Agri-processing:** Right now it is low (12 per cent in the organised sector), particularly in fruits and vegetables (2.5 per cent). Upgrading capabilities is essential for market integration

Other challenges/ thrust areas: The capital to output ratio in horticulture is relatively high, but the output per unit of land and its monetised value are

higher too. Supply-side constraints must be addressed to respond to demand growth. Some focus areas are:

- Address structural challenges via FPOs (farmer producer organisations), etc. to improve operational efficiency of small farms
- Risk management through contract farming, real-time advisories and crop insurance
- Maximise production through orchard rejuvenation, rational crop geometry, besides promoting alternative technologies like hydroponics and aeroponics
- Digital technologies for precision farming, certified seed production and nursery banks
- Alternative marketing channels, export facilitation and intervention schemes akin to MSP
- Job generation and supplementary incomes through processing and other activities like beekeeping and mushroom farming

THE GIANT STEPS

➤ In FY24, horticulture output was 359 MT from around 28 mha, outstripping foodgrains at 329 MT

➤ India's per capita per day consumption of fruits and vegetables is far below the ICMR benchmark of 92 gms and 300 gms respectively

➤ With our projected population of 1.65 billion by 2050, the country must target a horticulture output of 1,000 MT by 2047/50

Green Revolution-plus: India's per capita per day consumption of fruits and vegetables is far below the ICMR and National Institute of Nutrition recommendation of 92 gms and 300 gms respectively. With our projected population of 1.65 billion by 2050, the country has to target a horticulture output of 600 MT by 2030, and 1,000 MT by 2047/50. The mission has to be anchored around science, technology and innovation and integrated

horticulture value chain systems. Since the value chain takes off from the results of R&D, it is key to driving the horticultural revolution. The demands on R&D include productivity improvement through germplasm enhancement and its utilisation by focussing on documentation, characterisation and conservation of plant genetic material; identification and use of genes in hybridisation for resistance against climate change, pests and disease; application of biotechnology to tap diverse traits including resistance against biotic and abiotic stresses; enriching bioavailability of nutrients; high quantum generation of biomass that can strengthen bio-resource-based enterprises. Achieving 'Green Revolution-plus' through horticulture alongside productivity enhancements in staples is key to India's agricultural future. ■

The author is CEO, National Rainfed Area Authority, Ministry of Agriculture & Farmers' Welfare

FROM VISION TO REALITY

NCDC'S 'SAHKAR SE SAMRIDHI' STRATEGY FOR SUSTAINABLE DEVELOPMENT THROUGH COOPERATIVE INNOVATION

Inspired by the Hon'ble Prime Minister Shri Narendra Modi's vision of "Prosperity through Cooperation" and led by Union Home Minister and Minister of Cooperation Shri Amit Shah, National Cooperative Development Corporation (NCDC) is committed to strengthen the cooperative sector and elevate the economic status of cooperative members nationwide. Established in March 1963 under an Act of Parliament (NCDC Act of 1962), NCDC has played a pivotal role in advancing the cooperative sector. Through a broad spectrum of activities, it aims at fostering agricultural development, supporting weaker sections, and driving integrated cooperative growth. NCDC's core mission revolves around strengthening farmer cooperatives, enhancing agricultural marketing and processing and promoting regional development. With Hon'ble PM's vision of transforming India into an Aatmanirbhar and Viksit Bharat by 2047, NCDC's role becomes even more crucial. Now, let us delve deeper into these areas to explore NCDC's achievements and initiatives in greater detail:

Commitment to Rural Progress: Implementing National Schemes and Launching New Initiatives

The NCDC, headquartered in New Delhi, with 18 regional offices and 5 sub-offices across India, has been steadfast in its commitment to promoting cooperative development. It has been at the forefront of implementing pivotal national schemes, significantly impacting various sectors. Noteworthy among these initiatives are the Scheme for Formation and Promotion of 10,000 Farmer Producer Organizations (FPOs), Pradhan Mantri Matsya Sampada Yojana (PMMSY), Fisheries & Aquaculture Infrastructure Development Fund (FIDF) Scheme, Pradhan Mantri Formalisation of Micro Food Processing Enterprises (PM FME), Pradhan Mantri

Kisan Sampada Yojna (PM KSY), Integrated Cold Chain and Value Addition Infrastructure Scheme, Agricultural Marketing Infrastructure (AMI), Mission for Integrated Development of Horticulture (MIDH), and the National Beekeeping and Honey Mission (NBHM). These schemes reflect NCDC's commitment to fostering growth and development across agriculture, fisheries, and food processing sectors.

After the formation of Ministry of Cooperation, NCDC introduced two significant schemes to further its mission. The Deergbhavadi Krishak Punji Sahakar Yojna focuses on extending long-term loans to agricultural credit cooperatives, enabling them to provide long-term loans and advances to their members for various activities and services under NCDC's purview. Additionally, the Swayam Shakti Sahakar Yojna aims to bolster women Self Help Groups (SHGs) and Joint Liability Groups (JLGs) by providing them with necessary support through credit cooperatives. These new schemes underscore NCDC's dedication to enhancing financial inclusion and empowerment within rural communities.

Exceeding Targets and Setting Standards: Stellar Financial Performance

In the fiscal year 2023-24, NCDC made significant strides in supporting cooperative societies across India. It sanctioned an impressive ₹92,013.44 crore for 2529 units and projects, benefiting 11015 cooperative societies. The disbursements amounted to ₹60618.47 crore, including a subsidy of ₹399.93 crore, with ₹6.75 crore from NCDC's own corpus. Remarkably, the disbursements exceeded the target by 21.24%. NCDC demonstrated robust financial performance with a net profit before tax of ₹740.23 crore, maintaining a net NPA of zero percent and

achieving a loan recovery rate of 99.70%. The net profit per employee was an impressive ₹2.68 crore. Adhering to prudential financial practices, NCDC maintained competitive interest rates and introduced floating rates of interest. NCDC is an organization of professionals committed to strict regulatory and financial norms, dedicated to excellence and impact.

Revolutionizing Cooperatives through Unparalleled Financial Assistance

NCDC has provided cumulative financial assistance exceeding ₹3,13,198 crore to cooperative institutions. In the financial year 2023-24 alone, its disbursements amounted to ₹60618.47 crore,



marking a significant increase of nearly 48% compared to the previous year. With the formation of the Ministry of Cooperation, development of the cooperative sector has been further accelerated through NCDC. Under the cooperative sugar mills strengthening scheme, the Government of India approved a grant of ₹1,000 crore for cooperative sugar sector, enabling it to distribute additional loans up to ₹10,000 crore at reasonable rates.

NCDC places emphasis on non-agricultural sectors as well such as dairy, livestock, handloom, silk production, and poultry, with a special focus on scheduled castes, scheduled tribes, and women cooperatives. It supports these sectors through various schemes aimed at income generation via



cooperation. Promotion and financing of programmes in cooperatively Least/Under-Developed States is a major thrust area of NCDC programmes. During FY 2023-24, the Corporation sanctioned working capital assistance of ₹73,347.74 crore and disbursed ₹52,555.93 crore for MSP operations. Cumulatively, as of 31.03.2024, NCDC has disbursed ₹1,96,307 crore for this purpose, with ₹1,88,215 crore disbursed in the last 10 years.

NCDC's Transformative Initiatives for Capacity Building and Training

NCDC through its Sahakar Pragya initiative and the Laxmanrao Inamdar National Academy for Cooperative Research and Development (LINAC), has emerged as a pivotal force in capacity building and training. Positioned in Gurugram, Haryana, with 18 Regional Training Centres (RTCs) across India, LINAC serves as the training, research, and consultancy arm of NCDC. It emphasizes developing professionalism in primary cooperatives within the agriculture and allied sectors, designing and executing need-based programmes for cooperative personnel and officials. Collaborating with esteemed entities like Centre for International Cooperation and Training in Agricultural Banking (CICTAB), Network for the Development of Agricultural Cooperatives in Asia and the Pacific (NEDAC), and other international agencies, LINAC extends its specialized training



to cooperators in India and SAARC countries. In FY 2023-24 alone, LINAC conducted 96 training programmes in both online and offline modes. The conducted training programmes comprises of 2 International programmes, 6 programmes for LINAC-NCDC Fisheries Business Incubation Centre (LIFIC) under Pradhan Mantri Matsya Sampada Yojana (PMMSY), 7 programmes for Farmer Producer Organisation (FPO), 30 programmes for Ministry of Cooperation, 10 programmes for Dairy Cooperatives, 1 programme on Warehouse Management and Scientific Storage, 6 programmes for Organisation Development and 34 other programmes. The training programmes conducted have benefitted 7923 participants comprising of different levels of stakeholders of the cooperative sector. In addition, LINAC through 18 Regional Training Centres (RTCs) conducted 98 training programmes benefitting 3941 participants from primary level cooperatives. This extensive outreach and impact underscore NCDC's unwavering commitment to fostering a robust and professional cooperative ecosystem, driving significant advancements in capacity building and training across the nation.

Empowering Fisheries Cooperatives: NCDC's Transformative Role in India's Blue Economy

India's extensive coastline of 8,129 kilometers and 6.879 million hectares of inland water bodies offer vast opportunities for fish production. Over recent years, the nation has seen a significant surge in fish production and marine product exports, which have boosted foreign exchange earnings, provided protein-rich food, created jobs, and increased fishermen's incomes. Since 1974-75, NCDC has been instrumental in assisting fishery cooperatives at primary, district, and state levels, either directly or through state governments. In collaboration with the Department of Fisheries, NCDC provides financial assistance for deep-sea trawler projects.

Assistance for Deep Sea Fishing Vessels Mega Project In Maharashtra And Gujarat

In FY 2023-24, NCDC sanctioned financial assistance of ₹11.55 crore to Department of Fisheries, Govt. of Maharashtra for acquisition of 14 Deep-Sea Fishing Vessels for Coastal Fisheries Co-operative Societies of Maharashtra at the block cost of ₹20.30 crore under Corporation Sponsored Scheme of NCDC. Another project of Deep-Sea Fishing Vessel was sanctioned to Shree Mahavir Machhimaar Sahakari Mandali Ltd. Junagadh, Gujarat for ₹14.40 crore for Procurement of Deep-Sea Fishing Vessels for 30 member of the Society at the block cost of ₹36.00 crore. NCDC has also been empowered as one of the Implementation Agencies

for the Formation and Promotion of Fish Farmer Producer Organizations (FFPOs) under the Pradhan Mantri Matsya Sampada Yojana (PMMSY). This initiative aims for an inclusive and sustainable transformation of the fisheries sector through a holistic and supportive ecosystem. In the initial phase NCDC has registered 70 FFPOs.



Department of Fisheries, Government of India has allocated 1000 existing primary fisheries cooperative societies to the NCDC for strengthening as FFPOs in the Coastal States/UTs with an outlay of ₹225.50 Crore.

Vision for the Future

NCDC's vision for the future is centred on expanding its reach and impact, aiming to exceed a disbursements target of ₹3 lakh crore. This ambitious goal underscores NCDC's commitment to fostering the cooperative movement and empowering cooperative societies across India. By continuing to innovate, provide extensive financial support, and enhance training and capacity-building initiatives, NCDC is poised to lead the cooperative sector towards a more prosperous and sustainable future. Under the guidance of the Union Home Minister and Minister of Cooperation Shri Amit Shah, NCDC remains dedicated to realizing the vision of "Prosperity through Cooperation," ensuring that cooperatives continue to be a vital part of India's economic and social fabric.





DIVERSIFY THE FOOD EXPORT BASKET

To join the major league in the global agri market, India must leverage the opportunities in animal husbandry, dairy, fisheries and horticulture

In 2023-24, India's agriculture exports amounted to \$48.8 billion (Rs 4.1 lakh crore), 8 per cent lower than the previous year, one of the many reasons being restrictions on export of several agri commodities. India is a small player in the global agriculture produce trade now (less than 3 per cent share), but there is huge potential, provided it can produce reliable surpluses in agriculture, animal husbandry, dairy, fisheries and horticulture. Building modern infrastructure for the product categories in which we are globally competitive will be crucial in this. In the 10 years of the UPA government, agriculture exports rose from \$8.7 billion (Rs 72,867 crore) in 2004-05 to \$43.3 billion (Rs 3.6 lakh crore) in 2013-14. Since then, growth has been muted, initially due to depressed global prices and, lately, due to adverse weather conditions, which persuaded the government to impose restrictions on export of wheat, rice, sugar and even onions.

and broken rice, which is mainly exported to Africa. India produces about 20 MT of surplus rice that can be exported. More private investment will come in milling if the segment is kept free of sudden imposition of restrictions on exports.

Marine products: Frozen shrimp and fish are the major items of marine exports. That a network of nucleus breeding centres for shrimp brood stocks is to be established is good news. The marine sector faces environmental challenges due to overfishing, habitat destruction and climate change. Seafood also requires an integrated cold chain and high-capacity chilled warehouses. The ministry of food processing industries (MoFPI) must provide grants for cold chain projects of marine products.

Spices: Export of spices earned the country \$4.5 billion (Rs 37,900 crore) in 2023-24, but it is becoming more challenging due to stricter global norms on pesticide residues, microbial contamination and purity. In May, Hong Kong, Singapore and Nepal restricted import of spices from reputed Indian companies because they exceeded the limit of ethylene oxide. Post-harvest processing infrastructure needs support and investment to meet the stringent requirements of traceability and certification.

Dairy and buffalo meat: Buffalo meat exports peaked at \$4.4 billion (Rs 37,032 crore) in 2013-14 but dropped to \$3.7 billion (Rs 31,140 crore) by 2023-24. The meat trade has faced restrictions and violence during transport of animals. As a result, the volume and value of exports have gone down. We have 72 modern integrated abattoirs meeting global norms for safety and standards, but the West does not allow import of meat from here as India does not meet the standards of the World Organisation for Animal Health (WOAH). Dairy products from India are also not permitted into the EU on grounds of foot and mouth disease and non-compliance with WOAH regulations. India needs to take up the issue during FTA negotiations with the EU and the UK.

India's share in the export of processed foods globally is only 1-2 per cent currently. The government, in association with the private sector, must carry out a strong branding exercise in developed markets, focusing on the diversity and the non-GMO (genetically modified organism) quality of Indian produce.

India has a big opportunity to build on the success of grapes and banana exports. In 2023-24, we exported around 400,000 tonnes of grapes worth \$417.1 million (Rs 3,509 crore). A system of traceability coupled with reliable cold chains enabled this. Banana has also been a success story of Indian horticulture; in 2022-23, we exported produce worth \$176 million (Rs 1,481 crore). Once APEDA (Agricultural & Processed Food Products Export Development Authority) finalises the sea protocols for fresh fruits and vegetables, India has an opportunity to substantially increase exports. Meanwhile, exports of wheat, rice and sugar are facing a challenge in the WTO from the US, EU, Brazil and Australia, among other nations. So, an emphasis on the diversification of the export basket is necessary. ■

The author is a former Secretary, Ministries of Agriculture and Food Processing Industries

THE GIANT STEPS

➤ **India has less than 3% share in the global agri produce trade. It needs to generate reliable product surpluses and build modern storage infrastructure for products where we are globally competitive**

➤ **In FY24, rice and marine products made up 35% of agri export earnings. The govt should insist on GI recognition for Basmati in FTA talks with EU. For marine products, it must provide grants for cold chain projects**

Rice: Rice (\$10.4 billion or Rs 87,110 crore) and marine products (\$7.4 billion or Rs 61,986 crore) made up about 35 per cent of India's export earnings from agri products in 2023-24. Export of basmati rice was 5.2 million tonnes (\$5.8 billion or Rs 48,580 crore). This was despite the imposition of a minimum export price. Most of this rice is sourced from Punjab, Haryana and Uttar Pradesh. Even if the efforts at crop diversification succeed, rice production and export are unlikely to go down as it is remunerative for farmers and is in high demand in West Asia, the UK and the US.

But pesticides not approved in Europe and the US have to be banned. Much progress has been made in educating farmers about the prudent, scientific use of chemicals. Basmati rice is not recognised as a GI (Geographical Indication) product by the European Union. So its unique identity, premium status and market value are adversely impacted. India has a strong claim in this regard and the government should insist on GI recognition in FTA (free trade agreement) negotiations.

Non-basmati rice exports went down from 17.8 MT (\$6.4 billion or Rs 53,850 crore) in 2022-23 to 11.1 MT (\$4.6 billion or Rs 38,700 crore) in 2023-24. Lower exports were due to restrictions on export of raw rice (non-basmati white rice)



NAFED

**An Institution of the Members,
by the Members, for the
Members**



Ms. Kamna R Sharma
Additional Managing Director,
NAFED

This realization which emerged some where in the middle of the 18th century marked the beginning of an era which transpired into one of the biggest people's movement in the form of Co-operative Movement.

It didn't take much time for the movement to reach India. India, being an agrarian economy, also embraced the Co-operative model, the principles of mutual-aid, concern for communities which are inherent in this model best suited for addressing the issues of rural credit, marketing of agriculture produce, and community welfare.

Although the Co-operatives are institutions built upon open and voluntary membership and democratic management, the role of the Government becomes important for supporting these institutions for realizing their objectives and at the same time maintaining the spirit of these institutions.

The National Agriculture Co-operative Marketing Federation (NAFED), is one of the oldest National level apex marketing federation established in 1958 with a view to provide marketing assistance to the agriculture marketing co-operatives and also help its marketing co-operatives in the other agricultural

operations. Since the member co-operatives of NAFED draw membership from the farmers, therefore the hierarchical three-tier structure consisting of Primary Cooperatives at the bottom, State Level Cooperatives in the middle and NAFED at the top is best suited for reaching out to the farmers and to extend the benefits to the farmers. This structural advantage also makes NAFED one of the best institutions for implementing the farmer-centric Government schemes.

NAFED is one of the largest procurement as well as marketing agencies for agricultural and horticultural produce, significantly contributing towards making agriculture viable and sustainable for the farmers, thus supporting the rural economy in a big way. NAFED, through its country-wide operations, plays a crucial role in improving the living conditions of farmers and bringing prosperity to the rural economy. At a larger level, NAFED's relentless country-wide agri-related operations ensure food security for the nation and provide efficient market linkages to the farmers.

NAFED undertakes the multifarious activities benefitting the farmers and stakeholders

- NAFED is one of the Central Nodal Agencies of the

“
There is but one mode by which man can possess in perpetuity all the happiness which his nature is capable of enjoying, - that is by the union co-operation of all for the benefit of each,”

Robert Owen,
the father of Cooperative movement.

Government of India for the procurement of Pulses and Oilseeds under the Price Support Scheme (PSS). Whenever the prices fall below the Minimum Support Price (MSP) declared by Government of India, NAFED undertakes procurement of the notified crops of Oilseeds, Pulses and De-husked Coconut, Milling/Ball Copra, etc. at MSP.

- Procurement of Pulses and Onion under Price Stabilization Fund (PSF) scheme of Government of India as one of the Central agencies by creating buffer stocks of said commodities.
- Procurement of Wheat and Paddy at MSP as a State Nodal Agency on behalf of the Food Corporation of India and the State Governments under De-centralized Procurement (DCP) scheme.
- Suppling Milled Pulses to Army, CPMFs and State Governments under PDS, MDM, ICDS welfare schemes.
- As one of the Central Seed Agencies of the Department of Agriculture & Farmers Welfare (DAC&FW), Government of India, NAFED undertakes production, distribution and marketing of certified seed of Pulses, Oilseeds and Cereals under the Seed Mini kit Distribution programme and also against general supplies to various States.
- Undertakes the supply of Agri-commodities like Pulses, Food Grains, Spices, Edible Oils,

perishables like fresh fruits and vegetables and other commodities to various countries towards humanitarian assistance on behalf of the Ministry of External Affairs, Government of India.

- Production and marketing of Bio-Fertilizers for sustainable agriculture.
- Production of Compressed Bio Gas (CBG) by treating various types of Agri and municipal wastes.

Empowering the Farmers

NAFED is committed to transmitting the benefits directly to the farmers. With this objective in view, NAFED is endeavouring to gradually phase out the middle agencies. This process has already been initiated and NAFED intends to complete the same at the earliest. A landmark step in this direction was the launch of the e-Samridhi portal of NAFED by Hon'ble Union Home and Cooperation Minister, Shri Amit Shah, during the National Conference on 'Self-reliance in Pulses' at New Delhi on 4th Jan 2024. It is an online platform that is designed by NAFED to facilitate farmers for selling their produce by registering on e-Samridhi website (<https://esamridhi.in/#/>) or application. With its enhanced accessibility, farmers can register themselves from anywhere, ensuring easy and convenient access to the platform. NAFED will provide Minimum Support Price (MSP) to farmers, as decided by the Government of India, for various commodities and the payment to the farmers is transferred directly to their bank accounts without the involvement of any middle agency.

NAFED an institution with the vision for benefits for all :- Bharat Brand - Quality and Affordability for Every Home

Under the Open Market Sale Scheme (OMSS) of the Department of Food and Public Distribution (DFPD), Ministry of Consumer Affairs, Government of India, NAFED launched the Bharat Brand range that includes essential items such as Bharat Dal, Bharat Atta, and Bharat Rice. NAFED offers these products at affordable prices to support consumers while aiding farmers by providing a reliable market for their produce. This initiative is a part of Government of India's broader effort to promote self-sufficiency in agriculture thus realising the Hon'ble Prime Minister's vision of Atmanirbhar Bharat. Bharat Chana Dal is available at ₹60/kg, Bharat Moong Dhuli at ₹107/kg, Bharat Moong Whole at ₹93/kg, Bharat Atta at ₹27.50/kg, and Bharat Rice at ₹29/kg. These products can be purchased at NAFED Bazaar outlets, both offline and online, as well as at various other retail outlets.

Strategic Procurement of Pulses and Oilseeds to Support Farmers

As per the directions and approval of Department of Consumer Affairs (DoCA), NAFED has undertaken the procurement of 2.80 lakh MT of Pulses valued at ₹1,911.91 crore under Price Stabilization Fund (PSF) for the year 2023-24. Additionally, following the directions and approval of the Department

of Agriculture and Farmers Welfare (DA&FW), NAFED has procured 37.36 lakh MT of Pulses and Oilseeds valued at ₹21,820.39 crore under the Price Support Scheme (PSS) during the year 2023-24. This initiative aims to help farmers receive remunerative prices for their produce, encourage higher investment in agriculture, and increase the production and productivity of agricultural commodities.

NAFED's Global Reach

To make its presence in global markets and with a view to augment business activities for generating additional revenue for the Federation, NAFED undertakes export/import of various Agri-commodities and articles to/from overseas countries. During the financial year 2023-24,



• NAFED has undertaken following business activities-

• **Humanitarian Aid to Afghanistan:** NAFED successfully supplied 10,000 MT of wheat to Afghanistan as part of a humanitarian aid initiative, operating on behalf of the Ministry of External Affairs, Government of India.

• **Export of Non-Basmati Parboiled Rice to Mauritius:** Under a Government-to-Government initiative, NAFED exported 1,000 MT of Non-Basmati parboiled rice (05% broken) to Port Louis, Mauritius, on a CFR (Cost and Freight) basis.

• **Supply of Non-Basmati White Rice to Bhutan:** NAFED supply 2,080 MT of Non-Basmati White Rice to the Food Corporation of Bhutan Limited. This supply was executed on behalf of National Co-operative Exports Limited (NCEL).

NAFED's Role in Price Stabilization and Market Support

Under the direction of the Ministry of Consumer Affairs, Food & Public Distribution, NAFED successfully procured 2.2 lakh MT of Onions from Maharashtra and Madhya Pradesh for the Rabi season of 2023-24. This procurement was aimed at creating a buffer stock for the Price Stabilization

Fund (PSF) to stabilize market prices wherein the entire process has been automated and the payment of the procured stock has gone directly to the farmers.



SAHAKAR Se SAMRIDHI

NAFED stands as a cornerstone in India's agricultural landscape, bridging the gap between farmers and market stability. NAFED ensures that the benefits of agriculture are maximized for farmers while supporting the nation's food security and rural economy. NAFED's multifaceted approach not only enhances farmers livelihoods but also strengthens India's agricultural framework, fostering economic growth and stability for future generations.

The primary purpose of a cooperative is to serve the community in which it operates. NAFED has continuously endeavoured in being accessible to the farming community. A successful cooperative business can provide employment, investment opportunities, collaborative growth and even distribution of wealth, among other things.

With the strategic advantage through its organizational structure, institutionalization by full automation of processes, interdisciplinary systems & network perspectives in food & agricultural products NAFED is truly committed towards realizing the objective of SAHAKAR Se SAMRIDHI. On the 78th Independence day NAFED expresses gratitude to all the farmers who have been behind the success of NAFED. JAI HIND !!!!!





WANTED: A PUSH FOR PULSES

Having achieved food security and net agriculture produce exporter status, India must now refocus to make a breakthrough in pulses. It also has to tackle nutritional security, malnutrition among young children

As we celebrate our 78th Independence day, we need to look back and see how far we have reached, but also look ahead to our goal of Viksit Bharat@2047. The first and foremost duty of any government is ensuring food security for the people. It's as important as ensuring border security. It was Lal Bahadur Shastri who gave us the slogan, 'Jai Jawan, Jai Kisan'. Faced with droughts in the mid-1960s, India did not have enough foreign exchange to buy food from the global markets. We needed at least 10 million tonnes (MT) to avert mass starvation deaths. The US came to India's rescue at the time by offering 10 MT of wheat under Public Law 480 (food aid) against rupee payment, which was like a grant, as the rupee had no standing in the global markets. Every 15 minutes, a ship was coming to India with food aid, which was distributed through the PDS (public distribution system). India was considered a 'ship to mouth' economy, and many had given up hope of the country surviving as the population was booming and food supplies were lagging far behind.

The solution to India's precarious food situation then also came from an American, Norman Borlaug. He is the true father of our Green Revolution. His seeds of high yielding varieties (HYV) of wheat (18,000 tonnes of Sonora64 and Lerma Rojo) were imported from Mexico. No wonder he got the Nobel Prize for Peace as he saved millions of lives, perhaps more than what a war takes away. That laid the foundation for our Green Revolution. Around the same time, India also imported HYV seeds of rice (IR-8) from the International Rice Research Institute (IRRI) in the Philippines, for which we have to thank Henry Beachell and Gurdev Khush. The rest is history. Since those days of 'ship to mouth', India is now the largest exporter of rice, accounting for over one-third of global exports. India's rice exports in the past three

THE GIANT STEPS

➤ From our 'ship to mouth' days in the 1960s, India is now the largest exporter of rice, accounting for over one-third of global exports

➤ Focusing on pulses and oilseeds is the need of the hour. It will give us much better nutrition with much less damage to groundwater, soil, greenhouse gas emission and biodiversity

➤ Rationalising agri subsidies and putting the money in R&D, irrigation, water management and rural infrastructure will ensure food and nutritional security in the future

years equal exports of the grain from Thailand, Vietnam and Pakistan put together. So, in a humble way, India is today contributing to global food security. And this is after giving free rice/wheat (5 kg/per capita/per month) to over 800 million Indians. This must be the biggest programme by any country to give food security to its people.

Focus on pulses and oilseeds: India's success story on the food front is not just a green (rice) revolution, but also white (milk), blue (fish) and so on. India is a net exporter of agricultural produce. Its exports (roughly \$50 billion or Rs 4.2 lakh crore) range from rice, marine products, spices, buffalo meat to several fruits and vegetables. But its imports of food items (roughly \$35 billion or Rs 2.9 lakh crore) are highly concentrated in edible oils and pulses. India needs to make



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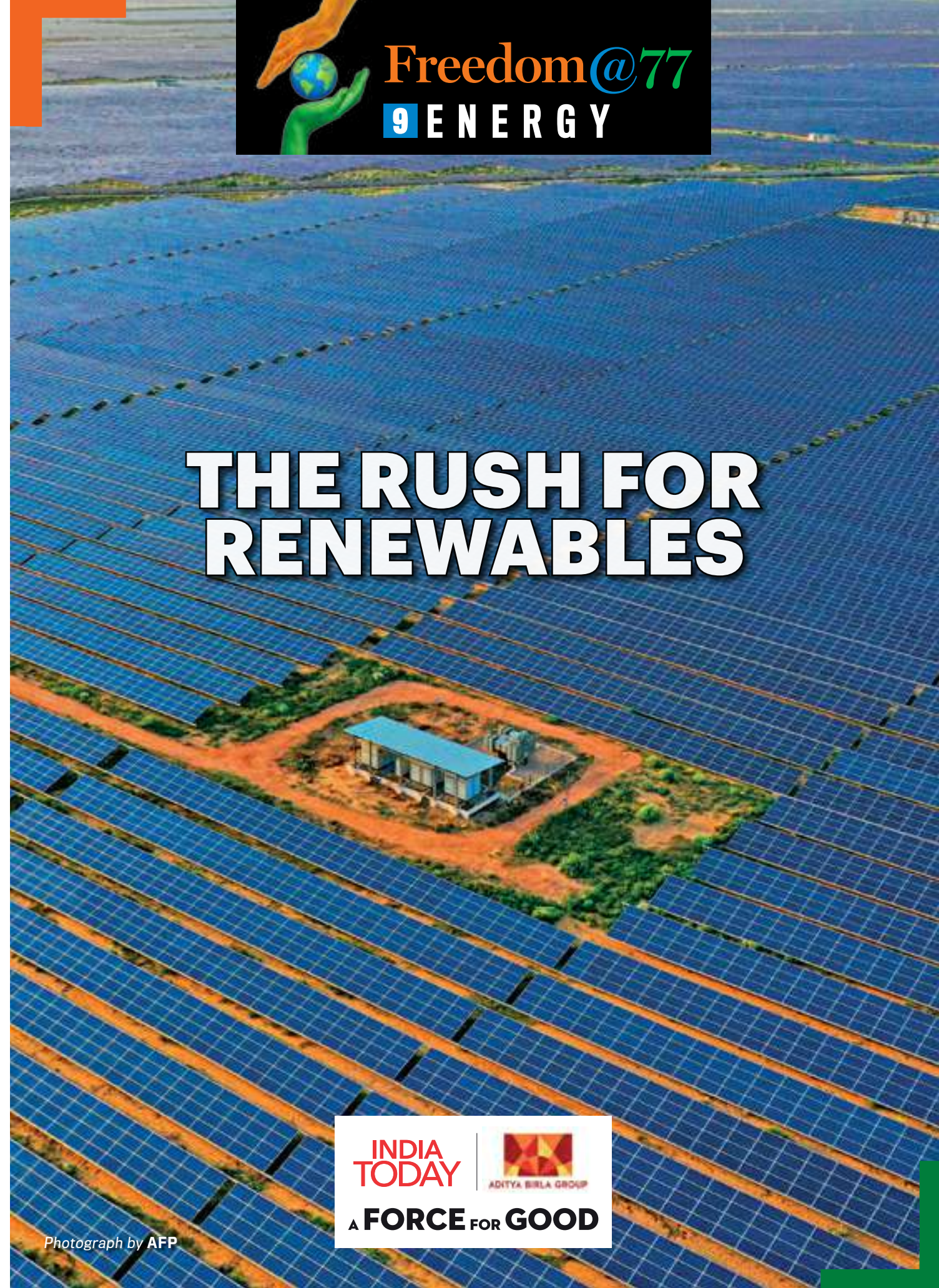
a breakthrough in pulses, which are much more nutritious than rice. This requires crop-neutral incentives, meaning pulses and oilseeds should get similar subsidies and market support as rice or wheat get in, say, the Punjab-Haryana belt. Also, much more is required in agriculture R&D. This would also help to promote climate resilience in our cropping pattern as pulses and oilseeds are legumes requiring much less water and fertilisers than rice. Thus, focusing on pulses and oilseeds, as we did on rice and wheat during the Green Revolution days, is essential. It will give us better nutrition with much less damage to groundwater, soils, greenhouse gas emissions and biodiversity.

Thus, we need to move from just food security to nutritional security, especially of our children below the age of five. A significant population of our children (35 per cent) is still stunted (low height for their age). Our research at ICRIER shows that malnutrition in children is not just because of a lack of healthy food, but also due to low education of women (mothers), poor access to sanitation and immunisation. Prime Minister Narendra Modi needs to be commended, for in his first I-Day speech in 2014, he said that he would prioritise building toilets all over the country to give dignity and hygiene to the people. And he did just that. His mega programme of providing safe drinking water to every household, 'Har ghar, nal se jal', and building pucca houses in rural and

urban areas (PM-Awas Yojana), are some other commendable programmes to provide sanitation to all. With these basic programmes in place, and if India can ensure a 7 per cent overall real GDP growth rate (and about 10 per cent in dollar terms), which is very much feasible, India has a chance to become a \$30 trillion economy by 2047, with substantial improvement in the economic well-being of its people. That would be a dream come true.

No complacency: But all this should not lead to complacency on the agriculture front. Climate change with extreme weather events can give strong shocks to our agriculture. Given that our population by 2050 will be around 1.67 billion, the largest on the planet, we cannot afford to lose focus on food and nutritional security. For that, we will have to rationalise many subsidies, including for food and fertilisers, which amounted to Rs 3.7 lakh crore in the Union budget of Rs 48 lakh crore for FY25. There is scope to save at least 25 per cent of this subsidy amount without adversely affecting the main stakeholders. That money needs to be put in agri R&D, irrigation, water management and rural infrastructure. If we can do that, India can ensure food and nutritional security, and promote inclusive growth for Viksit Bharat@2047. ■

The author is Distinguished Professor at ICRIER



THE RUSH FOR RENEWABLES

THE PATH TO CARBON ZERO

India is well on its way to meet its target of net zero emissions by 2070. Meanwhile, it needs to tap its natural resources and leverage the renewable power generation infrastructure to become a world leader in the supply of renewable energy

By **Jumana Shah**

When it comes to going green, India may well be making others go green—with envy. The country may be the third-largest carbon emitter in the world in terms of absolute numbers, but it also has the lowest per capita GHG (greenhouse gas) emissions. Now, it is well on its way to achieve its committed target of ensuring that 50 per cent of the country's energy is met from decarbonised sources and there is more than 500 GW of green power generation by 2030. Not only is this remarkable in itself but India seems to be doing much better than other developed countries like the UK and Germany, for instance, in meeting its Nationally Determined Contributions or NDCs. The two countries have, in fact, dialled down their targets in the wake of the pressure on their economies. India plans to hit net zero emissions by 2070, the target set at the most recent global climate change meet.

It is from here on, however, that India's journey will get tricky. For one, our energy needs are expected to grow twofold by 2047. The country's peak power demand is estimated to touch 400 GW in 2031-32 from 245.2 GW currently. Green energy is also expensive, though India is banking on technology to make its production cheaper. Then, there is the timeline. As Czech-

Canadian scientist and policy analyst Vaclav Smil says, a "widespread transition from one dominant fuel to another typically takes 50-60 years. It will require generations of perseverance". Finally, for almost all the alternative energy sources available currently, India is dependent on import of raw materials critical to the process as also the machinery, even as China has become an indispensable source of critical minerals and rare earths.

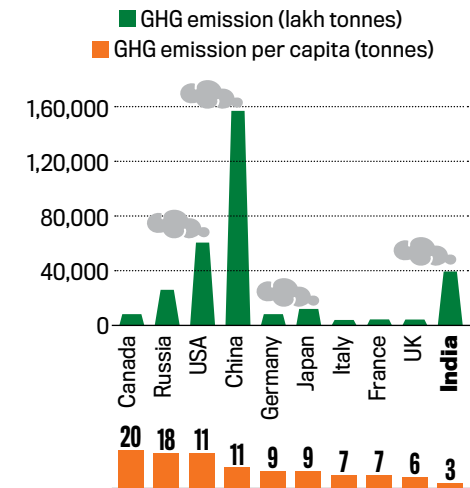
"The answer thus lies in the *aatmanirbharta* of green resources," says Kartikeya Sarabhai, director of Center of Environment Education in Ahmedabad. We must also invest in indigenous research and development (R&D) while achieving economies of scale in manufacturing within the country to offset the additional cost of shifting to newer evolving technologies. These are on the lines of the government's chosen path too, based on its policy measures. "India has been deploying clean energy technologies at an accelerated pace since 2009," says Rishabh Jain, senior programme lead for Technology Futures programme at CEEW (Council on Energy, Environment and Water). "Thanks to India's natural resources and endowments, there is huge potential for deploying clean energy technologies such as solar, wind (onshore and offshore), hydro, bioenergy and green hydrogen. When deployed at scale, there can also be economic opportunities for manufacturing the key components domestically, creating new jobs and economic growth. China has been manufacturing clean energy technologies for the whole world, but countries are now looking

THE NEW POWER GAME

India must reduce its dependence on coal and harness alternative sources for power generation

MARCHING AHEAD

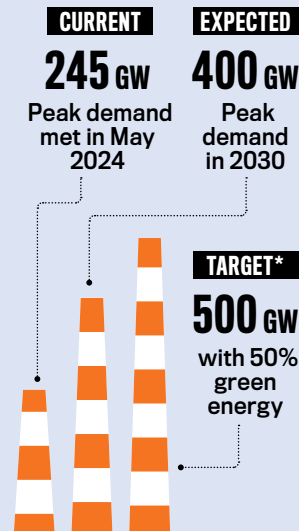
India is among world's top 10 polluters but low on per capita emissions



Source: Emissions Database for Global Atmospheric Research (EDGAR)

POWER PROJECTIONS

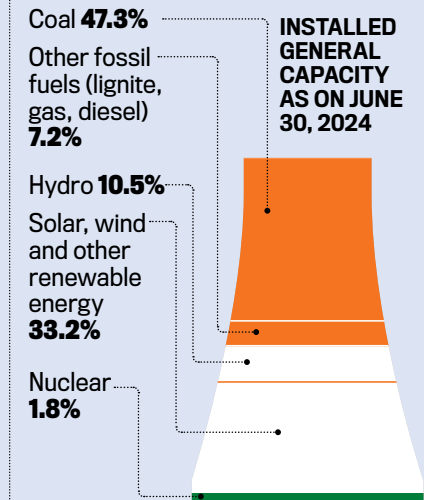
(Current and expected demand for power)



Source: NITI Aayog and Central Electricity Authority; *by 2030

THE ENERGY MIX

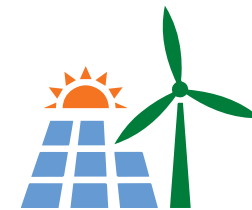
Fossil fuels remain the dominant source of energy in the country



to diversify their supply chains. India can tap into the opportunity and formalise partnerships with developed countries to supply these products. There is, however, a need to focus on sections of the value chains where it is, or can be, competitive at a global scale without government support, which will ensure the long-term sustainability of the sector." Exports, adds Rahul Tongia, senior fellow with the Centre for Social and Economic Progress in New Delhi, should be driven by strategy, not revenue targets. "The domestic market itself has a voracious appetite, and we should aim to prioritise that demand. Export premiums are also important and the two should ideally not be mutually exclusive. India should aim at emerging as a player exporting full-fledged services critical for uptake in the entire supply chain, not just commoditise the cheapest products. Countries may have a China-plus-one strategy, but that cannot be sustained just on any cost advantage we might offer, which itself is tough. China has slack capacity, so it's hard to beat them on cost."

COAL, THE ELEPHANT IN THE ROOM

At the climate change summits, much to the displeasure of developed nations, India has steadfastly asserted that it will not abandon coal but will minimise it, since its lower income sections cannot bear the burden of the steep additional cost. Since coal accounts for nearly 70 per cent of India's power generation, the thrust is on increasing



TARGET 2030

- Reduce economy's carbon intensity by 45% over 2005 levels
- Meet 50% of energy requirements from renewables
- Build 500 GW non-fossil energy capacity by 2030
- Reduce total projected carbon emissions by 1 billion tonnes by 2030
- Aim for 5 MT annual production capacity of Green Hydrogen, and 125 GW of renewable energy
- Develop 50 solar parks with aggregate 37.5 GW capacity
- Keep offshore target of 30 GW for wind energy
- Target 27 GW from PHS (pumped hydro storage) and 47 GW from BESS (Battery Energy Storage System) by 2032

the efficiency of thermal power plants and deploying the latest technology to reduce emissions in the supply chain, from coal mining to transportation to storage. The government has also launched clean coal initiatives like the Coal Gasification Mission, which aims to gasify 100 million tonnes of coal by 2030. This will mean the adoption of advanced ultra-supercritical (AUSC) technologies. AUSC plants operate at much higher temperatures and pressures than conventional coal-fired power plants, improv-

ing thermal efficiency by 5-10 per cent. In her budget this year, finance minister Nirmala Sitharaman announced that National Thermal Power Corporation (NTPC) and Bharat Heavy Electricals Ltd (BHEL) will set up an 800 MW AUSC thermal power plant with indigenous technology jointly developed by NTPC, BHEL and the Indira Gandhi Centre for Atomic Research. In the private sector, the Adani Group is also planning massive investments in AUSCs.

HELLO SUNSHINE

One of the best alternatives for India is to go solar—in a big way. And this is one area where the Modi government has done creditable work. The installed capacity of solar energy, at 82.64 GW (as on April 30), is at 19 per cent of the total, the highest green source of energy in the country. The target is to set up 450 GW capacity by 2030. The challenge is the over-reliance on imports for critical raw material as well as machinery for production. Manufacturers import up to 70 per cent of the raw material and almost all of the machinery for the production of photovoltaic panels from China. Solar power is also space-intensive, which is difficult in a country where land is premium. Experts like Sarabhai advocate that India seriously explore decentralising power generation to reduce costs of storage and transportation while scaling up capabilities. Reliance Industries recently announced plans to commission its first solar giga factory this year. To popularise solar energy adoption, the government had announced the PM Surya Ghar Muft Bijli Yojana in February 2024, with the ambitious aim of installing one million solar rooftops, incentivising individuals with free electricity of up to 300 units every month.

Biofuels like ethanol from agricultural waste can serve as another crucial resource in the country's search for self-sustainability, especially in rural areas. "India is naturally endowed with a lot of raw material, expertise and ability to lead in this area," says Rita Roychowdhary, Chief Executive—Climate Change & Sustainability Services, ECube Investment Advisors in Mumbai. "The capability and demand for this will have to be created at the local and state levels. The challenge is the raw material, which is segregated all across the country. There are entrepreneurship opportunities across the value chain." If the government incentivises the end use, she adds, this sector will get a boost as private companies enter the space and existing local players grow. India is also a part of the Global Biofuel Alliance, which allows it access to the latest technology. Biomass is also a source of hydrogen, which can also be channelised to generate green energy.

PROJECT GREEN HYDROGEN

Sourced from fossil fuels, biomass and a mix of water and renewable energy, hydrogen has emerged as the most promising green fuel of the future. Especially Green Hydrogen, which is produced with renewable energy. Currently, natural gas is the primary source for the production of hydrogen, contributing approximately 75 per cent to the global hydrogen output of around 70 million tonnes annually. Abundant renewable energy resources, a stable grid infrastructure, extensive coastline and ports, strong engineering and construction capabilities, and supportive legislation place India in a favourable position to export green hydrogen to the world. Private sector giants have announced massive investments in green hydrogen plants. So, Adani Green has announced an investment of Rs 4.15 lakh crore in constructing green hydrogen production facilities, advancing technology, and establishing essential infrastructure. Similarly, Reliance Industries Ltd has pledged around Rs 80,000 crore for the same.

India's Green Hydrogen Mission, launched in 2022, has set a target of 5 MT per annum (one tonne of hydrogen delivers about 33 MWh and a million tonnes about 33 terawatt hours). For this, India will need an additional capacity of 125 GW of renewable energy to produce green hydrogen. A May 2024 report titled 'India's Green Hydrogen Revolution' by the Ministry of New and Renewable Energy along with EY states that "India has Pumped Hydro Storage (PHS), which acts like a large-scale 'water battery', storing excess energy from renewable sources (like solar and wind) during off-peak hours and releasing it back during high demand, contributing towards round-the-clock availability of renewable energy for Green Hydrogen production". The National Electricity Plan 2022 estimates the need for 18.8 GW of PHS by 2032. Along with PHS, a Battery Energy Storage System (BESS) is being developed on a large scale to enable the availability of renewable energy.

Yet, challenges abound here too. Electrolysers, the core equipment for green hydrogen production, require a stable power supply to operate efficiently and prevent damage. The problem is that since green hydrogen is produced primarily from renewables, fluctuations in generation can disrupt production, which requires an effective management of the grid. The other hurdles are the high cost of production, storage and transportation, as also the high requirement of water for electrolysis, which is the most advanced technology for the production of hydrogen.

India has the resolve, and the resources, for greening its future. All it needs is to step up the implementation. ■

TAKEAWAYS

- ▶ Increase efficiency of thermal power plants and reduce emission in coal mining, storage and transport through use of tech
- ▶ Decentralise solar power generation to cut storage/transport costs
- ▶ Stabilise grid for hydrogen power production

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By **AJAY MATHUR**

BE THE GREEN CHAMPION

India's success in building up its renewable energy base and the successful dissemination of this knowledge to other countries will help it consolidate its position as a global leader in the sector

In 2023, India added 17,960 MW of electricity capacity; 72.3 per cent of it was renewable energy. Today, in India (as in most other geographies), solar electricity is the cheapest form of electricity available—though only when the sun is shining. This highlights the essential conundrum about solar and wind energy, especially in developing countries where the energy demand is still increasing both during the daytime and night hours.

Consequently, as we plan ahead, the key question is whether we add renewable energy capacity alone (thus depriving people of electricity at night) or add both solar capacity and fossil fuel-based capacity for the times when the sun is not shining and the wind is not blowing (thus increasing the cost of electricity for all)? In the developed countries, by contrast, no additional electricity capacity needs to be added; and solar and wind energy are backed by existing power capacity when solar and wind energy are not available.

In the progressive policy environment, we have, very recently—in the past six months or so—found prices, through tenders, for round-the-clock renewable energy (RTC-RE) at 85 per cent and 90 per cent availability (similar to that of fossil fuel-based power stations), based on solar + wind capacity (and sometimes with battery capacity to enable the achievement of higher quality), to be Rs 4 to 5 per kWh (kilowatt hour), whereas new coal-based power stations have been awarded tariffs in excess of Rs 5 per kWh. This is a game-changer, in as much as RTC-RE is now cost-effective in providing baseload power. And renewable electricity could be supplemented (by much more than only the balance 10-15

per cent availability requirement) by nuclear power, hydro power and other zero carbon-emitting electricity sources.

This highlights India's success in building up its renewable energy base. No other country—especially a developing one—has been able to meet the challenge of growing demand and RTC-RE supply at competitive prices. This also provides the basis for India to become a global champion for renewable electric power. For example, the policies that we have implemented and the lessons that we have learned have, time and again, shown us the way ahead to tweak and make the policies that result in even lower costs. This promotes and

THE GIANT STEPS

➤ **Solar electricity is the cheapest form of electricity available in India today, though only when the sun is shining**

➤ **India needs to figure out whether it adds renewable energy capacity alone or also fossil fuel-based capacity for when the sun is not shining and the wind is not blowing**

➤ **India is the only developing country that has been able to meet the challenge of growing demand and round-the-clock renewable electricity supply at competitive prices**



Illustration by **NILANJAN DAS**

enables upscaling. It has also created expertise in policy, design and implementation for renewable electricity. And also, to a large extent, expertise in pulling in private sector finance into renewable energy projects that are built now.

Becoming a global leader: These learnings, and their successful dissemination to other countries (by organisations such as the one that I lead), are the bedrock of our emerging success as a global renewable energy champion. Already, an Indian company is the cheapest EPC (engineering, procurement and construction) provider in the world. This is also true for providers of various solar applications such as solar pumps, solar cold rooms, solar mini-grids, etc. And hopefully, with the successful implementation of the performance-linked initiative (PLI) schemes, we will also be a global leader in the supply of solar cells and solar modules.

As we forge ahead, our learnings for upscaling the success of the cost-competitive RTC-RE that we have achieved, for example, through the availability of land (for solar, wind and battery projects), transmission lines (from renewable

energy projects to load centres), and enabling financing—at-scale (for the higher-than-normal first costs associated with setting up solar + wind + battery capacity); for the upscaling of rooftop solar and of solar pumps (through policies that enable effective business models to provide us with electricity or water services), and for cost-reduction of green hydrogen, produced through splitting of water using renewables-based electricity, provide examples of policies that work, and companies that are willing to take the risk of investing in renewable energy technologies.

The presence of this policy, design, implementation and maintenance expertise and of risk-taking companies are together expanding India's presence in global markets. Incentives provided by the Indian governments—to enable more Indian jobs to be created—would accelerate the process. In any case, with or without incentives, this diffusion of the Indian experience, expertise and products will only increase. ■

The author is Director General, International Solar Alliance



By Anil Kakodkar



HOW INDIA CAN CAPITALISE ON ITS THORIUM RESERVES

Leveraging thorium to produce nuclear energy helps address both domestic needs and the country's export ambitions

India's atomic energy programme has had some very distinctive achievements. It has enabled us to emerge as a nuclear weapon state (including nuclear submarine capability) while also delivering pressurised heavy water reactors (PHWRs) and associated nuclear fuel cycle technology that is commercially successful and is performing with global standards. India now operates 19 PHWRs of 220, 540 and 700 MWe (MegaWatt electric) unit sizes with 14 more 700 MWe units under construction in fleet mode. We are also close to commissioning the 500 MWe prototype fast breeder reactor and its fuel cycle as the next step in our three-stage strategy, aimed at ensuring long-term energy security for India based on our vast thorium reserves, which are the largest in the world. Thorium is also the preferred fuel for high-temperature nuclear reactors required for producing cheaper clean hydrogen to meet industry needs.

India has only modest quantities of uranium, the only naturally available resource for obtaining fission energy. This has necessitated our thrust towards converting thorium into uranium-233. The fissile material so generated can efficiently produce energy in situ or in a sustainable breeder cycle with thorium. In uranium reactors, use of thorium also enables advantages such as augmented accident tolerance and improved reactor parameters that augment safety and proliferation resistance. Further, in PHWRs, thorium

can increase the fuel burn-up to the level of other water reactors reducing the spent fuel arising by a factor of seven. These features can considerably soften the barriers to large-scale deployment of nuclear energy in emerging economy countries where the need for additional clean energy is the strongest in the context of realising net zero globally. India can thus become the energy capital of the world leveraging her thorium resources much the same way as major oil and gas-producing countries are today.

Viksit Bharat's energy requirement: Can this ever happen? The answer to this question lies in India's resolve to become a Viksit Bharat despite the net zero challenge and determination to develop thorium technologies for the purpose. To be *viksit*, one should realise a human development index of around 0.95, on par with developed nations. That would require per capita energy access beyond a minimum threshold. This threshold is around 2,400 kgoe (kilograms of oil equivalent) per year per capita. Since one expects a significant movement towards better energy efficiency through greater use of electricity and other measures, this threshold could significantly come down. Assuming that it would come down to around 60 per cent, the total energy requirement of Viksit Bharat would be around 28,000 TWh/yr (terawatt hour per year).

इंडिया टुडे

देश की भाषा में देश की धड़कन



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<input type="checkbox"/>	1 वर्ष	52	3120	999	डिजिटल	68%
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 नाम..... पता.....
 शहर..... राज्य..... पिन.....
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Illustration by SIDDHANT JUMDE



THE GIANT STEPS

- India has only modest quantities of uranium, the only naturally available resource for obtaining fission energy. This has necessitated our thrust towards converting thorium into uranium-233
- To meet the urgent need for clean energy, quicker introduction of thorium in pressurised heavy water reactors (PHWRs) would address the potentially unmanageable issue of large spent fuel inventory arising from the use of natural uranium
- It would make PHWRs an attractive proposition for emerging economies countries

We are rightly engaged in rapid renewable energy development. However, the total renewable energy potential in the country, including large hydro, is not likely to exceed 8,000 TWh/yr. This quantum of energy may be sufficient to meet today's energy needs. But how do we get two and a half times additional clean energy needed for Viksit Bharat? Clearly, thorium is the only answer. While we are progressing with accelerated deployment of PHWRs and even imported LWRs (light water reactors) to meet urgent clean energy needs, quicker introduction of thorium in PHWRs would address the potentially unmanageable issue of large spent fuel inventory arising as a result of the use of natural uranium on one side and make our PHWRs an attractive proposition for emerging economy countries on the other. In terms of economics and performance, they already are very competitive. Leveraging thorium thus helps address both domestic needs and support our export ambition. Since we must master the fuel recycle technologies of stage two and three in any case, this approach is also consistent with our planned three-stage programme.

Leveraging civil nuclear cooperation: We must also recognise the importance of leveraging our international civil nuclear cooperation, particularly with the United States, in realising such twin objectives. Nuclear fuel supply eventually becomes the larger business as compared to supply of nuclear reactors. High assay low enriched uranium (HALEU) is fast becoming an attractive proposition worldwide for various emerging nuclear reactor technologies. There is thus an urgent need for early demand signal for HALEU production infrastructure to grow. Deployment of thorium in PHWRs as highlighted earlier is precisely aligned to such an objective and can be deployed quickly through collaborative efforts between the two countries. As we approach net zero, the rising demand for clean energy would put global uranium supplies under considerable strain. India is thus well positioned to leverage her thorium resources and PHWR expertise to address the energy security of India and the world. ■

The author is former Chairman, Atomic Energy Commission

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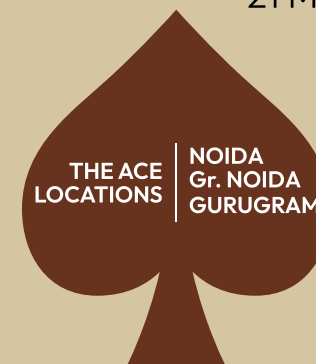
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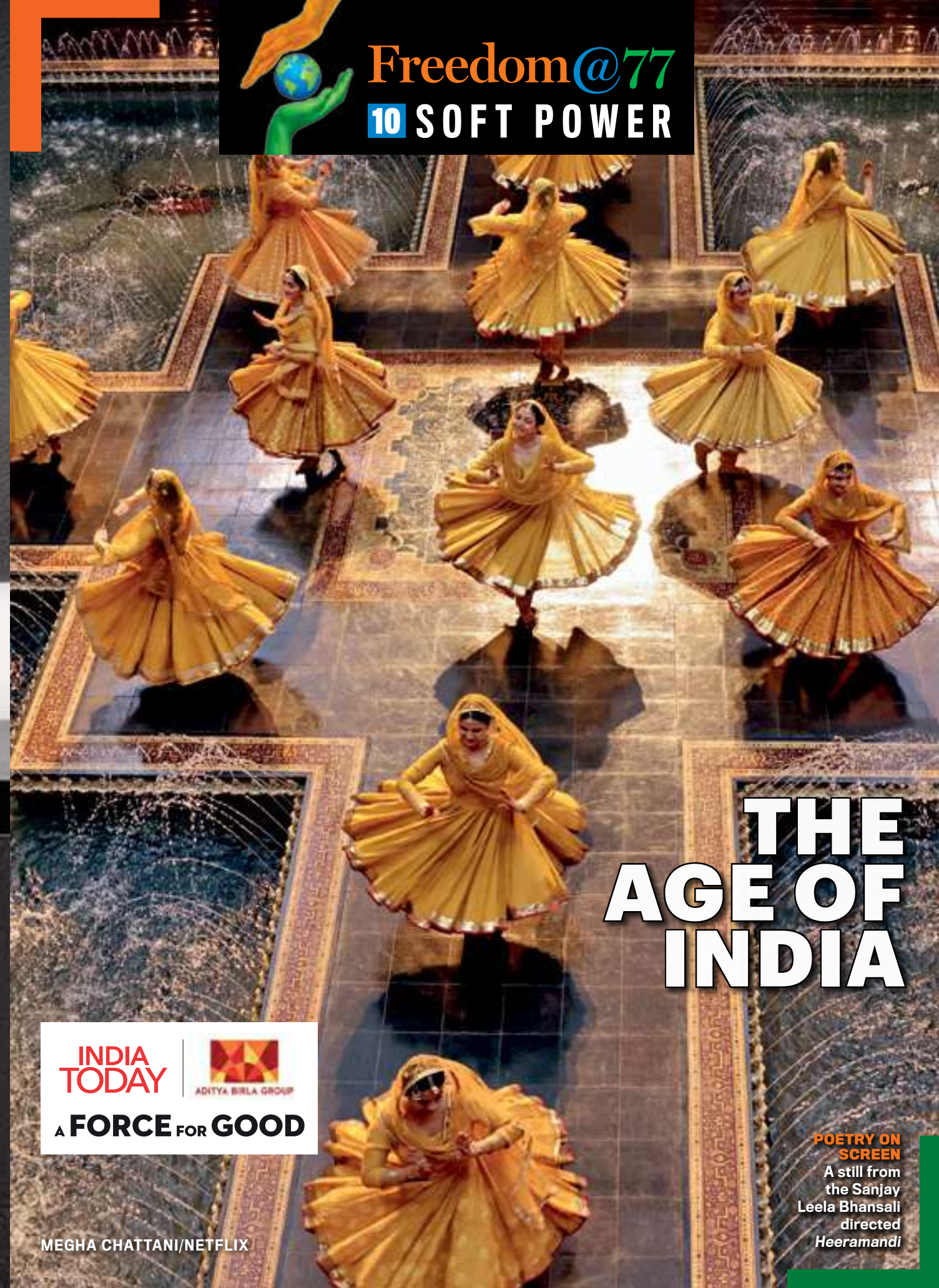
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POETRY ON SCREEN
A still from the Sanjay Leela Bhansali directed *Heeramandi*

THE ART OF MAKING AN IMPACT

India has taken considerable strides in the fields of films, performing and fine arts and sports in the past few years. Buoyed by private and state push, Indian talent has been finding recognition globally. While challenges remain, the future is promising

By **Suhani Singh**

In May 2024, TikTok saw the genesis of a trend that many found bewildering—women and girls from across the world shooting reels while they applied make-up wearing traditional Indian attire and lip-synced to the song “San Sanana”, from the 2001 Hindi film *Asoka*. That a two-decade-old song could suddenly start trending online with the hashtag “AsokaMakeup” is just one of the many examples of India’s cultural sway today. And you certainly cannot underestimate the role of a country’s soft power—whether through arts or sports—one that India can well expand.

From Diljit Dosanjh enrapturing concertgoers at the Coachella music festival, to Indian fashion designers making waves on the international circuit and artists having their works showcased at renowned museums like the Museum of Modern Art (MoMA), India is becoming more proficient in the art of showcasing its rich and varied culture. But nowhere is it more visible than in the growing presence of Indian films abroad. Last year, the world’s most prolific film industry

had 339 of its titles release across 38 countries and, in a rare instance, Hollywood Lionsgate studio bought the remake rights of the violent action thriller *Kill* this year. Netflix felt confident splurging nearly Rs 200 crore on Sanjay Leela Bhansali’s OTT debut *Heeramandi*—which was four years in the making—and had it dubbed in languages like Arabic, Malay, French, Thai and German. The OTT giant’s investment paid dividends, with the show featuring in the top 10 in 43 countries following its release this year.

It wasn’t the first time that an Indian title had become part of the global chatter with the help of streaming platforms. In 2020, *Delhi Crime* became the first Indian web series to win an International Emmy award. For Indian films to resonate globally, Somen Mishra, head of creative development and a producer at Karan Johar’s Dharma Entertainment, says Indian filmmakers need to follow a simple diktat: “The more local you think, the more global you can go. Give audiences a peek into the world that they have not seen. Not everything crosses over because it needs to be of a certain

BIG SCREEN, BIG COLLECTIONS

International earnings of some of the big Indian grossers of the past decade

*DANGAL (2016) ▼
\$291.33mn



*PK (2014) ▼
\$89.75mn



Pathaan (2023) ▲
\$95.1mn



Baahubali 2 (2017) ▲
\$233.97mn



RRR (2022) ▲
\$151.46mn

Figures have rounded off
Data as per Box Office Mojo
*Released in China

THE SCOREBOARD IN ATHLETICS

A look at India’s performance and medal haul in the past four summer Olympics

2012 (LONDON)	2016 (RIO)	2020 (TOKYO)	2024 (PARIS)
TOTAL: 6	TOTAL: 2	TOTAL: 7	TOTAL: 6
Gold: 0	Gold: 0	Gold: 1	Gold: 0
Silver: 2	Silver: 1	Silver: 2	Silver: 1
Bronze: 4	Bronze: 1	Bronze: 4	Bronze: 5
Overall rank 56	Overall rank 67	Overall rank 48	Overall rank 71

INDIAN ART MAKES WAVES

Some eyeball-grabbing sales in recent years

1. *The Storyteller* (1937)
By Amrita Sher-gil
₹61.8 cr

Auction by Saffronart gallery held in New Delhi in September 2023



2. *Gestation* (1989) By S.H. Raza
₹51.75 cr Pundole’s Fine Art Sale in Mumbai on August 31, 2023

3. *Untitled* (1969) By Vasudeo Gaitonde

₹42cr Sold by Pundole’s at an auction in Mumbai in February 2022

4. *Bull on Rickshaw* (1999) By Tyeb Mehta
₹41.97cr

Saffronart’s spring live auction held in Mumbai in April 2022

5. *The Lovers* (1960) By F.N. Souza ₹40cr
At Christie’s Asian Art Week sale in New York in March 2024

LAST YEAR, THE WORLD’S MOST PROLIFIC FILM INDUSTRY HAD 339 OF ITS TITLES RELEASE ACROSS 38 COUNTRIES, AND HOLLYWOOD LIONSGATE STUDIO HAS BOUGHT THE REMAKE RIGHTS OF THE ACTION THRILLER KILL THIS YEAR

scale and aesthetic and better world-building is needed.”

Many filmmakers though don’t get the resources to execute their vision. Writer-directors Payal Kapadia (of Cannes winner *All We Imagine as Light* fame) and Shuchi Talati

(Sundance festival winner *Girls will be Girls*) had to depend on independent producers and international grants to get their films going. The lack of support for independent voices in cinema is cause for growing concern, more so with the waning power of the National Film Development Corporation of India. OTT was seen as an outlet for independent voices to express themselves with its emphasis on ingenious storytelling and freedom from the pressures of box-office collections, but the platforms, too, have “started feeling the pressure of numbers”, says Mishra about the changing trends in the almost eight-year-old streaming industry. For Mishra, one way to make way for the indie spirit into commercial Indian cinema is by emulating Hollywood. “They picked up good indie guys to direct big, tentpole films,” he says, citing films like the recent *Twisters*. On his part, Mishra has roped in the likes of Neeraj Ghaywan (*Masaan*), Shazia Iqbal (*Dha-*

dak 2), Vasan Bala (*Peddlers*) and Reema Maya (*Nocturnal Burger*) to direct for Dharma.

The Hindi film industry had its all-time best year theatrically last year, with domestic revenues reaching Rs 12,000 crore and three films—*Pathaan*, *Gadar 2* and *Jawan*—breaking into the new club of Rs 500 crore. Indian cinema, long seen as too diverse, is now a more unified entity thanks to OTT platforms that carry content with subtitles and film channels that carry dubbed films. The result being that actors like Prabhas (*Baahubali* and *Kalki 2898 AD*), Allu Arjun (*Pushpa*), Yash (*KGF films*), Fahadh Faasil (*Aavesham*) and Vijay Sethupati (*Maharaja*) are widening their fan base beyond their respective states. Films are now being enjoyed without barriers. Collaborations are gaining traction—Shah Rukh Khan entrusted Tamil filmmaker Atlee to make a Hindi film (*Jawan*) and Nag Ashwin roped in the stalwart Amitabh Bachchan and Deepika Padukone to play key roles in his sci-fi epic *Kalki 2898 AD*.

Over the years, many Indian films have captivated hearts and minds the world over and shaped pop cultural sensibilities. The next step is making a sizeable dent in the global box office, as Aamir Khan's *Dangal* did in China in 2016.

THE QUEST FOR MEDALS

India's Olympics campaign in Paris may not have gone as per plan, yet despite the many heartbreaks, the contingent returned with six medals, just one short of its haul in Tokyo three years back. Even as cricket continues to be the invincible big daddy of sports, efforts are being made to show that India isn't a one-trick pony. Earlier this year, Prime Minister Narendra Modi shared his desire of India hosting the 2036 Olympics. Economic prowess and infrastructure though won't help India's bid, for what will matter is also the talent and size of its contingent. For 2036 to become a reality, the groundwork to boost India's participation in other disciplines needs to get going now.

The government, on its part, has increased the sports budget for its flagship project Khelo India, which promotes athletes from the grassroots level with a series of competitions, to Rs 900 crore. The Sports Authority of India, which apart from its centres also manages the Centre's TOPS (Target Olympic Podium Scheme to assist sportspersons participating in international competitions and training abroad) initiative, was allocated Rs 822.6 crore. But there's scope for more. "The place where we are missing out is participation of private sectors in funding from their CSR budgets," says Bhavit Sheth, co-founder and COO of Dream Sports, a sports tech conglomerate which supports athletes like India's top table tennis player Sreeja Akula, among a host of others. Some progress has been made. While the army and navy and PSUs like Bharat Petroleum and Indian Oil Corporation have had a long tradition of providing job security and financial support to athletes, corporate influence in sports has increased with

FROM ENTHRALLING THE AUDIENCE AT GLOBAL MUSIC FESTIVALS TO ARTISTS HAVING THEIR WORKS SHOWCASED AT MUSEUMS LIKE MOMA, INDIA IS BECOMING MORE PROFICIENT IN THE ART OF SHOWCASING ITS RICH AND VARIED CULTURE

Reliance Foundation, JSW Sports and the Tata Group investing in athletes as well as developing facilities.

However, for India to be a sporting powerhouse in the league of United States, China and Japan—countries that finished in the top three in the medal table of the 2024 Olympics—the role of sports science is as significant as coaching, mental conditioning and nutrition, says Sheth. He also identifies the lack of competition, at school, university and international levels, as a factor that has hindered the growth of talent. "Until we develop an ecosystem in other sports like we have for cricket and international exposure like IPL provides, sports can't grow," says Rajkumar Dubey of Bharat Petroleum, the PSU that has 56 sportspersons currently on its payroll across 15 different disciplines and another 28 under contract and scholarship.

LIBERATING THE ARTS

On March 31, 2023, India flexed its cultural muscles with the launch of the Nita Mukesh Ambani Cultural Centre (NMACC) in Mumbai, for which the who's who gathered to watch the musical *Civilization to Nation* at the opulent Grand Theatre, the only venue in the country that has the tech and logistic specifications to host big-scale Broadway shows. But as much as NMACC has provided a much-needed fillip to the rich performing arts traditions and artists with the gallery space and pavilions, there's a need for more such institutions that make art accessible and also appealing.

"What the government sometimes tries to do is use insti-



SONGS OF INDIA
Diljit Dosanjh performs at the Coachella music festival last year

GETTY IMAGES

TAKEAWAYS

👉 **Films are now being enjoyed without barriers of language or region and collaborations are gaining traction**

👉 **One way to incorporate the indie spirit into commercial Indian cinema is by roping in independent filmmakers to direct for mainstream production houses**

👉 **Khelo India budget increased to Rs 900 cr. But use of sports**

science and school and university level competitions for talent growth crucial

👉 **There is also need to have more art schools with vibrant education programmes and to encourage art without prejudice**

India's performing arts are rich and still relevant. What they need is patronage and outreach

tutions to manufacture culture. What we have to do is create institutions that enable expressions that are taking place," says Tasneem Mehta, managing trustee and honorary director of the Bhau Daji Lad Museum based in Mumbai. "Have great museums, great performing art spaces... We have to

open our minds." For Mehta, the urgent need is to develop more art schools that have a vibrant education programme and to encourage art without prejudice. "Great quality of art is [when] you can take difficult, fraught issues and present it in moving ways," she says. "It can be a celebration and presentation of the human condition. We can't just pretend we are living in a perfect world." Institutions like the revamped Bharat Mandapam and JSW's Hampi Arts Labs suggest that both the government and private players prioritise arts.

The fine arts scene in the country has grown in the past few years with Indian artworks breaking sales records (see graphic *Indian Art Makes Waves*) and artists like the late Bhupen Khakhar being celebrated at Tate Modern. But the going isn't easy for practitioners of classical performing arts, who find themselves grappling for attention and relevance in a fast-changing world. "Artistes need a regular source of income—employment, pension. The akademis should have a list of the 'needy'," says historian, critic and author Ashish Mohan Khokar. India's performing arts are rich and still relevant, what they need is patronage and outreach. India, says Khokar, needs to take pride in its own culture.

Our growing cultural clout is evident in how Shah Rukh Khan's charisma works in international markets, how Neeraj Chopra's wondrous arm wows the athletics world and that Brand Sabyasachi is renowned globally. The diversity and richness of our cinema and artistic practices and the potential of our young athletes can ensure that India remains top of the conversation. ■



FINDING OUR SPORTING GENE

A competitive, structured grassroots programme and a robust public-private partnership model where everyone involved is singing from the same song sheet, is our surest way to success

I was asked to write this piece a few days after the Paris Olympic Games got underway, and I must admit, the way I feel about everything I have expressed is even more pronounced because it is being written after watching India win medals with confidence and miss podiums by a whisker. We may not have surpassed our tally from Tokyo, but we had a big number of athletes who came very close to stepping on the podium, and if those fine margins went our way, our numbers would have doubled. There is a sense of despair at what could have been, but with it is also a feeling of confidence of what can be.

Neeraj, Manu, Swapnil, Aman and the men's hockey team were phenomenal, but so were Vinesh, Mirabai, Nishant and Lakshya. Avinash Sable may have finished 11th overall, but he was the first male athlete from India to qualify for the final of the 3,000-metres steeplechase event. No Indian male badminton player had ever gotten past the quarterfinal stage, and Lakshya changed that. We had performances that didn't translate to medals, but they were ones that give us renewed hope.

Going to the grassroots: While we're still reeling under the magnitude of the world's biggest sporting spectacle and are in awe of all that great sporting nations have achieved, it is the other end of the spectrum that we need to look at when it comes to building a culture that will get us to where we want to be—the grassroots. Our revolution needs to begin at the school and college levels where a highly competitive sporting structure should be introduced across government and private institutions.

The National Collegiate Athletic Association (NCAA), which is the bedrock of the American and global Olympic movement,

is a prime example of what a structured and competitive sporting culture at the grassroots levels can yield on the big stage. Sample this—the athletes who are part of the NCAA system from across 12 nations won a total of 60 medals at the Paris Olympic Games. Jamaica has the Champs—a nationwide inter-school athletics meet that is responsible for world champions like Shelly-Ann Fraser-Pryce, Usain Bolt and Yohan Blake, among so many others.

Closer home, cricket has cracked the system of producing players from school competitions. The Harris and Giles shields—two of the country's premier inter-school competitions in Mumbai, have produced some of the greatest cricketers—not just in India, but worldwide. School tournaments work as nurseries to generate talent.

We need to replicate this with Olympic sporting disciplines, and it will be a matter of time before we can begin scouting and recruiting very talented youngsters who can then be honed with the help of a professional programme. What this will also do is give rise to the number of coaches with a high degree of quality. A competitive structure at

the school level will automatically push these institutions to produce and recruit better coaches.

The direction to take: There is no single answer to the oft-repeated question of what it would take for India to be a global sporting superpower, but there is a direction that will get us there. A competitive, structured grassroots programme and a robust public-private partnership model where everyone involved is singing from the same song sheet, is our surest way to success. JSW Sports is in its third Olympic cycle, and I speak from a place of having experienced the benefits of corporate India working in tandem with the federations. The Inspire Institute of Sport aside, we have always gone above and beyond to be of use to federations that need expertise, aid or fillip. We have been supporting the National Rifle Association of India (NRAI) since 2019 and, at the time of writing this piece, all three of India's medals in Paris have come from our shooters. This isn't just happenstance. We've lent the Boxing Federation of India (BFI) our expertise in terms of technical support. A concentrated, consistent and collective push—that's what it will take to keep moving the needle of India's sporting ambitions.

If you're someone who has been following Indian sports, you will admit that the change in landscape has been encouraging, if not seismic. Our athletes aren't satisfied qualifying for global events anymore. They believe they can win them. There is a switch in mentality, and it is infectious. Neeraj Chopra, Lakshya Sen, Manu Bhaker, all walk into an arena with the kind of confidence and aura that champions possess.

When it comes to statistics and perspective, our population always finds a mention in relation to the medals we win at the Olympic Games, or when it comes to our FIFA ranking in world football. Our numbers are our strength, but only if we reach them. Our programmes need to cover the length and breadth of the country. We need a solid talent scouting system and a network of quality coaches making sure that no talent slips through the system. Add the application of sports science and access to high-performance facilities to the mix, and the results will begin speaking for themselves.

Building the fan base: The general awareness around the Indian athlete has risen rapidly. Broadcasters in India are bringing global events to people's homes because they're sensing the interest. Just like our athletes, the Indian sports fan, too, needs to be built, and the onus is on all stakeholders to capitalise on the work being put in by the corporates, federations and government by weaving and showcasing a narrative that is unfolding in Indian sport. Corporate India has come forward in a big way, and federations, too, have become welcoming of the support. However, if we are to achieve the standards we dream of, this push must increase a hundred-fold. We have a responsibility to take our nation where we want to see it on the global sporting map, because India's athletes aren't just showing up, they are turning up, and so must we. ■

The author is Founder, JSW Sports and Inspire Institute of Sport

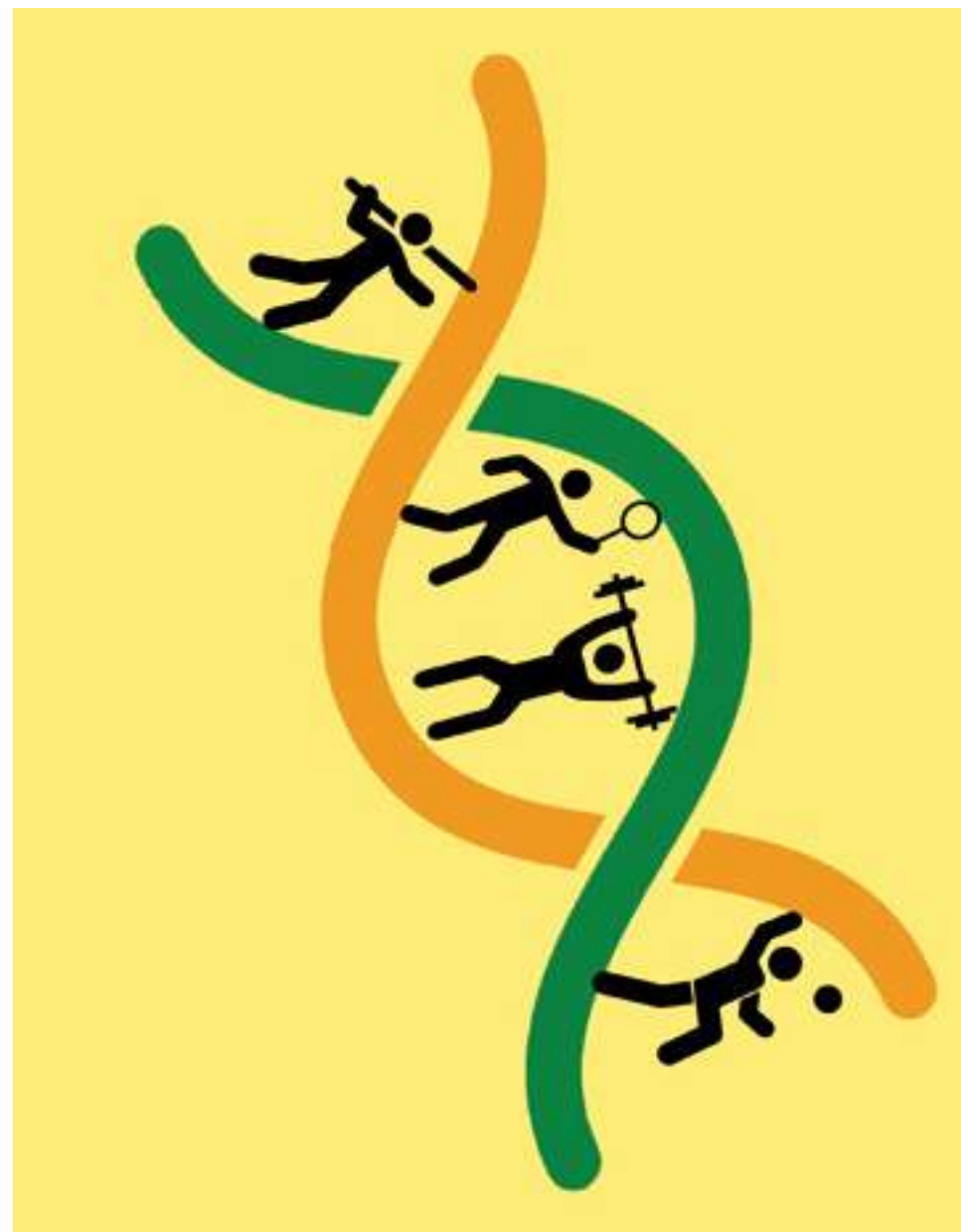
THE GIANT STEPS

➤ A highly competitive sporting culture should be introduced at school and college levels

➤ A concentrated, consistent and collective push is what it will take to keep moving the needle of India's sporting ambitions

➤ We need a solid talent scouting system and a network of quality coaches making sure that no talent slips through the system

➤ The application of sports science and access to high-performance facilities needs to be added to the mix





By Kiran Nadar



INDIA AS A CULTURE CZARINA

The growing interest in Indian art underscores the need for continued investment and collaboration to keep inspiring each other, driving one another forward

India is a bustling cosmopolis where everything, everywhere, happens all at once. Indians and Indian-origin heroes are thriving not just here but across the global cultural, business and political landscape. India's cultural heritage and legacy is deeply rooted in ancient tradition. It offers an unparalleled opportunity to shape global perceptions and foster creative synergies. India's primacy in the Geographical South is of immense importance in encouraging a cultural exchange with other countries. These collaborations enhance bilateral ties and create opportunities for a more inclusive and equitable world of art.

The Indian art market is currently at its strongest, with auction records being broken for iconic artists like Amrita Sher-Gil, S.H. Raza, Raja Ravi Varma and V.S. Gaitonde. Contemporary art sales are also on the rise, paralleled by a growing global institutional interest in South Asian art. Now more than ever, works by Indian artists are prominently featured in prestigious museums worldwide. I do believe that years of commitment to Indian and South Asian art by institutions, private collectors and foundations are finally seeing results. This is obvious from the number of artists being represented at the 60th Venice Biennale; additionally, institutional exhibitions currently on view that showcase South Asian artists include the Public Art Fund displaying the works of Huma Bhabha in New York, The Museum of Fine Arts, Houston, showcasing Raqib Shaw, and the Yorkshire Sculpture Park's sublime Bharti Kher display among others.

Unlike the Western art market, which has had centuries to evolve, the Indian art market is still relatively young. The culture of living with original artworks is a relatively new concept

but is rapidly catching on. The Ministry of Culture and other governmental bodies have supported various cultural festivals, exhibitions, and heritage conservation projects.

The changing landscape of art: Despite these achievements, we can do much more to amplify India's cultural exports and enhance its global standing. In the past few years, the landscape of art has changed drastically in India, with the emergence of new cultural and creative spaces in art, photography and design. What is most worthy of celebration is that there are a number of private organisations, foundations and institutions that have taken it upon themselves to place South Asian art onto the global stage. The Serendipity Arts Festival and Kochi Biennale consistently deliver outstanding showcases. Businessman and philanthropist Sunil Munjal's upcoming BRIJ initiative and institutions like the Nita Mukesh Ambani Cultural Centre in Mumbai and MAP in Bengaluru, amongst others, are actively contributing to this cause. Additionally, India Art Fair has played a consistent role in bringing together gallerists, curators and collectors from around the world. Most recently, Art Mumbai too has proved its mettle in this space.

These initiatives hint at the inclusion of art in every realm of life. This growing interest reflects a collective recognition of the importance of art in our society and underscores the need for continued investment and collaboration in this realm to keep inspiring each other, driving one another forward.

All of this has encouraged our ambitious plans to build our standalone museum and cultural centre signifying significant strides in this direction. The new location is spread over a prime expanse of land en route to Indira Gandhi In-



Illustration by NILANJAN DAS

ternational Airport. When it opens three years from now, it will be a confluence of ideas and conversations, a place of discovery, with engagement across a broad spectrum of audiences. The new KNMA will serve as a venue for visual arts, music, dance, and theatre, featuring a roster of exhibitions, permanent displays, and performances.

A collective endeavour: Promoting India's art and culture is a collective endeavour involving the government, cultural institutions, the arts and culture community, and patrons. By working together to promote and enhance India's cultural presence on the global stage, we can significantly elevate the nation's profile and influence. What might empower us as a country further is encouraging art education across all demographics—just like how it is in the West. Our country's children must have that access and interaction with high-quality art workshops and programmes. It will not just

engage but also empower a new generation of children to dream a little bigger and not treat this as a parallel universe but as something within their reach—to consider exploring a future in art.

Through sustained support for Indian artists and cultural projects, we can harness our rich heritage as an important form of soft power. As we navigate this evolving landscape, the potential for India's cultural exports to make a lasting impact on the global stage is both exciting and promising. Embracing this will contribute to a more fulfilled interconnected global cultural dialogue. In a world that increasingly values cultural diplomacy, I have faith that sometimes the first step is the hardest, but the rewards are everlasting. ■

The author is the Founder of the Kiran Nadar Museum of Art (KNMA)

THE GIANT STEPS

▶ The Indian art market is currently at its strongest, with auction records being broken for iconic artists. Contemporary art sales are also on the rise

▶ The government has supported various cultural festivals, exhibitions, and heritage conservation projects and private organisations too have taken it upon themselves to place South Asian art onto the global stage

▶ We must also encourage art education across all demographics

TAKING THE WORLD STAGE

It's time to embrace and better represent our diverse film industry, with its wide range of languages and storytelling styles, each with its unique flavour

From silent films to multilingual productions, Indian cinema has evolved dramatically over the past century. The term 'Bollywood', derived from combining Bombay (now Mumbai) and Hollywood, might be more familiar but suggests a narrow focus and global visibility on one segment of Indian filmmaking. Indian cinema is truly an amalgamation of a broad spectrum that tells stories across regional languages, cultures, and narratives. It's time to embrace 'Indian Cinema', and better represent our extensive and diverse film industry. Indian cinema includes a wide range of languages and storytelling styles, each with its unique flavour. Our cinema has always been a vibrant mix of music, dance, and storytelling. This tradition is deeply embedded in our cultural fabric. Pathbreaking filmmakers like K. Asif, Sanjay Leela Bhansali, and Anurag Kashyap have used music as a crucial element in their storytelling, shaping the narrative and enhancing the emotional impact of their films. This blend of music and storytelling is a hallmark of Indian cinema, reflecting our love for songs and dance while also evolving with contemporary trends and innovative storytelling.

Indian cinema gained international recognition thanks to the efforts of veteran filmmakers such as Bimal Roy, Satyajit Ray, Mrinal Sen, Adoor Gopalakrishnan, Shyam Benegal, Ketan Mehta, Mira Nair, Kalpana Lajmi, and Sudhir Mishra. Funded largely by the National Film Development Corporation of India (NFDC), these filmmakers showcased Indian stories on the global stage and received acclaim at international film festivals. However, the '90s and 2000s saw a shift towards Bollywood's love stories, exotic locales, and larger-than-life productions, which often overshadowed the middle class as they majorly delved into the complexities and



Illustration by **SIDDHANT JUMDE**



By **Guneet Monga Kapoor**

THE GIANT STEPS

➤ **The rise of OTT platforms has both helped with distribution of independent films and made it easier to access films from different regions**

➤ **The recognition received by Indian films on global platforms is a testament to Indian cinema's richness and diversity**

➤ **Overcoming language barriers and nurturing global partnerships with film festivals and distribution networks are crucial to further push this**

world of rich Indians. The 2010s marked a resurgence of independent cinema in India. Directors like Vikramaditya Motwane (*Udaan*), Vasan Bala (*Peddlers*), Ritesh Batra (*The Lunchbox*), Neeraj Ghaywan (*Masaan*), and Shlok Sharma (*Haraamkhor*) emerged, bringing fresh and innovative perspectives to the canvas of Indian films. During this period, independent filmmakers faced significant challenges with distribution and visibility. The struggle for screen space and theatrical runs was compounded by limited digital rights deals, making it difficult to reach wider audiences.

I recall my own experiences during this period, where the distribution of independent films was a major hurdle. In 2012, I sold the rights of *Gangs of Wasseypur* to Netflix, not as a two-part film but as an eight-part mini-series. This was a pioneering move, marking the first Hindi-language series on the platform. The advent of OTT platforms like Netflix and Amazon Prime Video has significantly influenced the diversity of Indian cinema. They have made it easier to access films from different regions, bridging gaps that previously existed. The pandemic further accelerated this shift, enabling audiences to explore diverse films from the comfort of their homes.

Bridging language barriers: "Once you overcome the one-inch-tall barrier of subtitles, you will be introduced to so many more amazing films," director Bong Joon-ho had said in his Golden Globes acceptance speech in 2020. He spoke for all of us filmmakers who try to tell stories as grounded and true to their intent as possible. To further push Indian cinema to a global audience, overcoming language barriers is crucial.

Additionally, nurturing global partnerships with film festivals and distribution networks can introduce Indian films to new markets while emphasising unique cultural narratives that resonate universally. Koreans have mastered this better than anyone else in the world. The hype around K-dramas is real.

As we navigate the post-pandemic world, the dynamics of film distribution and consumption continue to evolve. The decline in linear TV rights and the growing importance of digital rights highlight a shift in how films are financed and recovered. Despite the challenges faced by theatrical releases, there are still remarkable successes. Films like *Laapataa Ladies*, *12th Fail*, *Munjya*, and *Kill* have made a strong impact on audiences across India, though some have struggled to gain widespread theatrical success.

Going global: But if I were to define my favourite moment in Indian cinema, it would be the 2023 Oscars—where films like S.S. Rajamouli's *RRR*, Shaunak Sen's *All That Breathes*, and Kartiki Gonsalves's *The Elephant Whisperers* collectively represented India on the global stage. The recognition these films received is a testament to the richness and diversity of Indian cinema. This year, independent Indian filmmakers continued to make waves internationally. Payal Kapadia's *All We Imagine As Light* won the prestigious Grand Prix at the 77th Cannes Film Festival, while Vinay Shukla's Peabody Award-winning *While We Watched* and TIFF's People's Choice Award: Midnight Madness-winning *Kill* garnered global recognition, also becoming the first Hindi film to get a broad theatrical release in the US. These films, discovered at renowned film festivals like Sundance, Cannes, and TIFF, have received critical acclaim and highlighted the growing interest in Indian stories worldwide.

Documenting difficulties: Despite the promising successes of independent filmmakers in the recent past, documentary filmmaking in India still faces challenges. Historically underfunded, documentaries often rely on international funds, TV channels, and independent productions. The rise of streaming platforms has provided much-needed support, making documentaries more accessible and appreciated by regular audiences. Netflix, in particular,



(Clockwise from above) A still from S.S. Rajamouli's *RRR*, which not only did well globally but the song 'Naatu Naatu' from the film bagged the Oscar for Best Original Song in 2023; *Munjya* is among the films that left an impact on audiences this year; a still from *Kill*, the first Hindi film to get a broad theatrical release in the US and Kartiki Gonsalves's *The Elephant Whisperers*, which won the Oscar for Best Documentary Short last year



has played a crucial role in supporting and funding Indian documentaries, as seen with *The Elephant Whisperers* and *Period. End of Sentence*. As someone deeply involved in the documentary field, I am currently working on *Kicking Balls*, a film about child marriage in Rajasthan, directed by Vijayata Kumar and co-produced with Ashvini Yardi. The film revolves around young brides using football to challenge traditional practices. The growing appetite for realistic and impactful content in India indicates that documentaries have a promising future.

Our audience is ready for diverse formats and genres. This is a time for bold, innovative filmmaking. And from what I've seen, in the incredible work my peers, companions, and competitors have been up to, we've got a whole lot more to offer. As I stated in my speech after the Oscar win for *The Elephant Whisperers* in 2023, "The future is audacious, the future is us, and the future is here. Jai Hind!" ■

The author is an Academy Award-winning Indian film producer & Founder, Sikhya Entertainment

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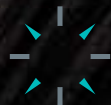
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