FICCI

McKinsey & Company

India's century – Achieving sustainable, inclusive growth

A roadmap for India Inc.

December 2022

A FICCI-McKinsey initiative

India's century

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सत्यमेव जयते

प्रधान मंत्री
Prime Minister

MESSAGE

It is heartening to learn about the 95th Annual General Meeting (AGM) of FICCI and the release of India's Century Study Report on the occasion. Greetings and best wishes to everyone associated with this endeavour.

The 21st century is widely hailed as Asia's century and there are great expectations from India. The joint initiative by FICCI and McKinsey to release India's Century Study Report marks another step in this direction.

Due to comprehensive reforms, the nation is attaining a new speed and scale in economic growth. While on the one hand, policy interventions have empowered citizens and transformed institutions, there is also a passionate commitment towards minimising government interference in the life of citizens and enterprises.

Towards attaining this goal, we have implemented a series of initiatives, repealing outdated laws and needless compliances to enhance ease of living, as well as ease of doing business.

Today, the world looks towards India with trust and confidence to provide solutions to global challenges. Blessed with a wealth of natural resources, the innovative spirit of our entrepreneurs and technological expertise of our skilled youth, India is being seen as an attractive partner in economic growth.

We continue to march ahead with a firm resolve to strengthen the sentiment of becoming vocal for local. At the same time, we remain equally committed to make India a hub of global supply chains.

While a lot is happening, a lot more needs to be done to ensure that our country reaches its full potential in every domain.

I am sure that the presence of business institutions and leaders at FICCI's AGM will lead to a vibrant and interactive dialogue. These deliberations will help draw up a futuristic roadmap to further enhance economic growth that is sustainable and inclusive.

The next 25 years that constitute the Amrit Kaal is an occasion to work with a spirit of oneness to fulfil the collective resolve of the people to build a strong, self-reliant India.

I once again extend my best wishes to FICCI towards making the 95th Annual General Meeting a huge success.

(Narendra Modi)

New Delhi
अग्रहायण 23, शक संवत् 1944
14th December, 2022

Preface

India is at an inflection point as the country completes 75 years of Independence, and looks forward to the next 25 years. At this juncture, the Federation of Indian Chambers of Commerce and Industry (FICCI) and McKinsey & Company are collaborating on a multi-year 'India's Century' partnership to propose a set of actions to achieve India's full potential – unlocking the benefits of digital transformation, energy transition and modern infrastructure development for sustainable and inclusive growth.

This paper launches the partnership by setting out priorities and actions for companies in 10 major sectors, and suggesting where and how state and central governments could help enable and accelerate progress. It also lays down four horizontal capabilities that can help drive innovation, skilling, the scale-up of SMEs, and enhance India's position as a destination for global capital. The proposed initiatives have been developed with inputs from more than 200 companies, over 10 academic institutions, and through consultations with a wide range of domestic and international experts. While there is a long-term focus towards India's Century in 2047, the actions set out can begin right away, and the paper highlights specific operating metrics in each key sector which would need to be achieved in the next five to seven years.

Through the paper and associated initiatives over the next year (e.g., in the launch of Innovation Clusters), the FICCI–McKinsey & Company partnership will hopefully inspire and motivate companies, both big and small, start-ups and established leaders to drive actions that could achieve the country's potential to deliver millions of jobs and ensure sustainable and inclusive growth.

We look forward to your comments and suggestions and most of all your energy and leadership in driving actions to benefit all stakeholders.

Mr. Sanjiv Mehta
President, FICCI and CEO & Managing Director, HUL
President, Unilever South Asia & Member, Unilever Leadership Executive (Global Executive Board)

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Acknowledgements

This report is the product of a 9 month-long, cross-disciplinary research effort by McKinsey & Company India and The Federation of Indian Chambers of Commerce & Industry (FICCI). We owe special thanks to the core team, co-authors, sector experts and support team who worked tirelessly on the report.

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Executive summary

India's Century of independence is just 25 years away. The country is uniquely poised to build on its endowments and achieve broad-based prosperity by this landmark – having 60 crore (600 million) jobs to gainfully employ a growing workforce and increasing per capita income sixfold to ₹1 million[1].

To make this growth sustainable and inclusive (Exhibit 1)[2], India would also need to cut carbon emissions, create access to clean water for all, and include more women in the labour force.

While achieving this aspiration requires actions across stakeholders, this paper focuses on what India's businesses ("India Inc.") could do to realise the country's economic growth potential. It is based on insights gathered from over 200 companies on the economic opportunities that exist across every part of the economy and what India could do to seize these. The paper takes a sector-level view of global opportunities – identifying 10 priority sectors for growth over the next 25 years, and potential actions to unlock that growth.

[1] 1 million equals 10 lakhs.
[2] Reports (including, but not limited to, Niti Aayog's report (2021) on MDPI (OPHI, United Nations Development Programme) and calculations basis Real GDP growth and 2019 net emissions as baseline.

Exhibit 1

~60 Crore

overall jobs by 2047
(~1.3x the number of jobs today)

Sustainability

80-100%

reduction in CO_2 emission intensity

100%

access to water for all

₹ 10 Lakh

per capita income
(~6x the per capita income today)

Inclusion

45-50%

female participation in labour force by 2047 (~2x the participation rate today)

100%

population above poverty line

2047

India's Century of sustainable and inclusive growth

India's growth potential

A relatively younger workforce, a strong presence in manufacturing, and a vibrant, growing digital economy – these endowments position India well to work towards its aspirations for 2047:

- **A talent factory for the world:** India will be home to a fifth of the global workforce.[3] As developed economies age, India's relatively young population[4] could be enabled to meet shifting global demands for products and services.
- **Leadership in global supply chains:** India already supplies the world in the IT, automotive, and pharmaceuticals sectors. It also has expertise in multiple other growth sectors, such as chemicals, electronics, and software. As global supply chains shift in the wake of recent events, India could capture an increased market share of between $800 billion and $1.2 trillion by 2030.[5]
- **Rapidly growing a large digital economy:** With over 650 million internet users and low-cost data, India is one of the largest and fastest-growing markets for digital consumers.[6] In addition, it is likely to add over 350 million online shoppers in the next four to five years and develop a $5 billion online gaming and entertainment market.[7]

As India and Indians look to the future, it would be important to also account for the differing priorities and starting points of India's states. For example, higher-income states such as Delhi, Gujarat, Kerala, and Maharashtra are growing at a rate 1 percent higher than lower-income states like Bihar, Madhya Pradesh, Uttar Pradesh, and West Bengal. Agriculture accounts for more than 30 percent of all jobs in three states (Uttar Pradesh, Punjab, and Haryana), but makes up less than 10 percent in more than 20 states and territories.[8] Similarly, states in South and West India have a higher rate of female participation in the labour force than those in North and East India.[9]

[3] World population prospects data, Population Division of the Department of Economic and Social Affairs of the United Nations.
[4] Based on 2021 UN WPP data, the median age in India is 27 years, which is lower than the median age range of 30-40 years in China, countries in the European Union and North America, Australia and New Zealand, for example.
[5] Thomas Baumgartner, Yogesh Malik, and Asutosh Padhi, Reimagining industrial supply chains, McKinsey, August 2020.
[6] Digital India: Technology to transform a connected nation, McKinsey Global Institute, March 2019.
[7] E-commerce Industry in India, India Brand Equity Foundation, August 2022.
[8] Handbook of Statistics on Indian states 2021-2022, Reserve Bank of India.
[9] The power of parity: Advancing women's equality in India, McKinsey Global Institute, November 1, 2015.

Ten priorities by 2030

To help India realise its vision, ten sector-wise priorities for India Inc. could be considered.[10]

Aspirations across 10 Priorities for Sustainable, Inclusive Growth

Sector / themes	Drivers	From (2022)	To (2030)
Agriculture	Exports ($Bn)	~$50Bn	~$100 Bn
Manufacturing	High value exports in prioritized value chains	$140bn	$400bn
Consumer Tech	E-retail transactors (#)	~160 Mn	770 Mn
IT / ITES	Workforce trained in digital skills (%)	25-30%	100%
Financial services	MSME Formal Credit Lending (%)	<40%	>80%
Healthcare	Medical Doctors per 10,000 pop.	7-8	~20
Infrastructure and Logistics	Logistics Costs (% of GDP)	13-14%	8-10%
Emerging energy	Share of RE Generation capacity	155GW	500GW
Water	Households with Tap Water Connections	50%	100%
Education	Higher education Gross enrolment ratio	~27%	40-50%

[10] A more detailed set of aspirations and unlocks by sector appear on the India's Century microsite, and these will be tracked and updated each year. We will also add to the priorities for each sector and introduce priorities for additional sectors in future iterations.

01 **In agriculture, double exports from $50 billion to $100 billion by 2030 and the food processing industry from $300 billion to over $600 billion[11] by:**

- Creating end-to-end (e2e) value chains (for items such as fruit, vegetables, milk, and spices) by setting up export-oriented food parks and infrastructure (pre-processing and cold-chain, for example), harmonising export standards, educating farmers, establishing commodity-specific digital export platforms, and leveraging public-private partnership (PPP) models.
- Building low-capex pre-processing centres near farms — such as mango-ripening chambers and facilities for the osmotic dehydration of pineapples – to reduce spoilage, and upgrade processing units to handle multiple products that could increase utilisation from about 70 percent to over 90 percent.
- Supporting farmer producer organisation schemes (FPOs) by giving farmers agricultural start-up or micro, small, and medium enterprise (MSME) status. This would help improve access to benefits like tax exemptions, credit guarantees, and priority-sector lending.
- Developing AI-powered subscription products or services that build on data compiled from the Internet of Things (IoT), and remote sensors to customise the right solutions at the right time – such as ideal sowing windows, crop disease prevention, and storage mechanisms.
- Partnering with agriculture research and development (R&D) institutions, such as ICAR, IARI and NABARD,[12] Indian Agricultural Research unit (ICAR), to provide incentives and commercialisation support. Possible research areas include precision-farming technologies (including AI and IoT-driven robots), climate resilient and water efficient seed varieties, and organic solutions for crop protection and nutritional supplements.

02 **In manufacturing, triple high-value manufacturing exports to $400 billion, increase overall manufacturing productivity, drive down import manufacturing as a percentage of imports to 15 percent,[13] by:**

- Growing India's presence in five to six specific global value chains (e.g., electronics, chemicals, medical devices) by developing port-proximate clusters like the Mumbai—Thane—Raigad cluster for electronics and chemicals, adopting contract manufacturing to raise capacity utilisation to over 80 percent, launching supplier development programs (e.g., innovation grants), and facilitating single-window clearance.
- Becoming a green manufacturing capital by prioritising green alternatives such as bio-based feedstock and sustainable packaging, aligning industry standards for green labels, setting up recycling hubs, and boosting competitiveness with global firms by, for example, investing in high-volume giga-factories.
- Scaling up digitisation and software-enabled manufacturing, focusing on high-impact use cases (for example, using advanced analytics to digitise e2e supply chains at a stock-keeping-unit level to build value-chain resilience). Technology grants and international joint ventures could help secure technology expertise that would help to propel manufacturing into the digital future. Additionally, building capability through partnerships with academia, as well as upskilling employees on emerging technologies, could boost adoption of technologies such as blockchain.

[11] 15th Finance Commission's HLEG on agricultural exports submits reports, Government of India Finance Commission, July 2020.
[12] Indian Council of Agricultural Research (ICAR), Indian Agricultural Research Institute (IARI), National bank for agriculture and rural development (NABARD).
[13] BharatNet is the central government's flagship scheme to provide internet connectivity to all the 2.5 lakh gram panchayats (i.e., local village councils) in the country.

03 **In consumer technology, grow the number of e-retail transactors to 770 million by 2030 from 162 million in 2021, and increase the share of the digital and organised market in consumer spend from 27 percent in fiscal year 2020 to 54 percent, by:**

- Integrating datasets of national importance, (e.g., health data, grain value chain, land records, weather etc.) and developing digital platforms and ecosystem businesses by leveraging the digital India Stack through open APIs. Examples of applications could include personalising and pre-empting patient care based on health records and lifestyle data, leveraging the Agri Stack to reduce inefficiencies in logistics and enabling real-time monitoring of value chains.
- Supporting the development of industry standards and governance in data privacy, data management, and the right to repair, and emerging technologies like blockchain and cybersecurity. Government bodies could also build regulatory sandboxes to enable free experimentation with new technologies.
- Using Indian 5Gi standards to develop connectivity solutions, such as communications modules optimised for rural coverage, to ensure 5G access for over 90 percent of the population, and supporting the Ministry of Electronics and Information Technology (MeitY) to accelerate the execution of BharatNet.[14]
- Supplementing school curricula with technology literacy modules and strengthening learning outcomes through newer methodologies such as simulation or gamification (or both) to develop widespread proficiency in data analytics, basic coding, web development, and more.[15] Similarly, adult literacy courses could be designed, with an emphasis on the use of India Stack and technology, for banking, healthcare, and agriculture services.

04 **In information and communication technology, increase India's share of global software-as-a-service (SaaS) revenue from 1 percent to around 6 percent by 2030, and strengthen India's position as the global factory for digital, cloud, and analytics, by:**

- Aligning on an industry-wide skilling and certification mandate to continually qualify and upskill technology professionals in high-growth digital areas such as AI and machine learning (ML), IoT, product management, and user interface (UI) and user experience (UX) design. Furthermore, a standard curriculum and skill taxonomy could be shaped with industry bodies, such as NASSCOM and SaaSBOOMi to ensure a 100 percent digitally skilled workforce in IT-enabled services (ITES) by 2030.[16]
- Establishing India as an R&D hub for leading product companies through supportive policies, streamlined intellectual property (IP) protection laws, enabling infrastructure (for example, land and prototyping laboratories), and annual grants to scale up postgraduate research talent – especially in physics, mathematics, IT, embedded systems, and biology.
- Boosting at-scale SaaS companies tenfold by strengthening sales and go-to-market capabilities, forming partnerships with large technology firms to jointly pilot or develop offerings, and providing access to international target-customer segments.[17]

[14] BharatNet is the central government's flagship scheme to provide internet connectivity to all the 2.5 lakh gram panchayats (i.e., local village councils) in the country.
[15] A collaborative effort under the National Education Policy, launched in 2020. It involves state government collaborations with technology firms, industry bodies, and sector experts.
[16] Future skilling for the digital economy, NASSCOM, February 2020.
[17] Companies with less than $1 billion in annual revenues.

05 **In financial services, double the credit penetration of micro, small, and medium enterprises to 80 percent and remove gaps in the cost of commercial borrowing, by:**

- Launching use cases of the account aggregator (AA) framework for processes such as quick loan applications and tax filing for MSMEs, and leveraging beyond-banking data (such as GST, utility bills, online transactions etc.) to transform credit bureaus into credit and information bureaus.
- Promoting co-lending through product standardisation, commercial contracts, and accounting and reconciliation practices. Opportunity also exists to set up industry-wide digital debt platforms via API protocols, subject to regulatory provisions.
- Accelerating the creation of digital securities for various physical collaterals, such as land, property, and vehicles, to allow for digital verification and lien marking. The AA framework could be leveraged to accelerate information collateral adoption, such as utility bills, bank statements, income-tax filings, invoices, and receipts to increase credit penetration.
- Creating differentiated standards for non-performing assets in MSME sectors, based on sector-specific cash-flow cycles (such as crop cycles for agricultural traders, monsoon lows in construction, and tourism seasonality), and creating special provisions within the Credit Guarantee Trust for Micro and Small Enterprises scheme to enhance the adoption of MSME credit in key sub-sectors.

06 **In healthcare, double the number of doctors, nurses, and allied healthcare professionals per capita, reduce disease-adjusted life years by over 30 percent, and become a hospital to the world, by:**

- Leveraging digital healthcare solutions, such as telehealth solutions, under Ayushman Bharat Digital Mission (ABDM) to empower community healthcare workers[18] – including accredited social health activists, multipurpose health workers, and auxiliary nurse midwives – and to deliver higher-quality primary care for underserved segments (such as maternal and neonatal care, and disease screening).
- Boost MBBS graduates by allowing older medical colleges to double their intake of students within the next 3 years and enabling private hospitals to collaborate with medical colleges to enter an arrangement where pre and para clinical courses are conducted at the medical colleges whereas clinical courses are conducted at the hospitals. This could be accompanied by a parallel national campaign to promote nursing as an aspirational profession and boost enrolment in nurse training programmes.
- Enhancing insurance coverage through efficient underwriting for reduced premium costs by building on actuarial databases on top of PM Jan Arogya Yojana data and electronic medical records.

[18] Includes accredited social health activists, multipurpose health workers, and auxiliary nurse midwives.

07 In infrastructure and logistics, reduce logistics costs from 14 to 8 percent of the GDP, reduce infrastructure project cost overruns from 20 percent to less than 5 percent and increase skilled construction workers as a percentage of total workforce from less than 10 percent to more than 40 percent by:

- Deploying digital tools (such the use of digital twins) across project lifecycles and industrialising construction (for example, modular design and on-site assembly, to accelerate infrastructure execution timelines by over 50 percent).
- Encourage the registration, training, and accreditation of construction workers, leveraging various government initiatives like the e-Shram portal and others, and providing incentives to workers in the form of reimbursement of lost wages due to training, and rewards for the completion of accreditation courses.
- Enabling access to the national logistics ecosystem data (e-way bills, Goods and Services Tax Identification number, FASTag, Aadhar identification, and Vahan vehicle registration) to enable logistics players to analyse freight patterns, plan capacity deployment, develop inter-modal supply chains, and more.
- Formulate industry wide standards across cargo (packaging, palletization, labelling, handling), IoT based cargo tracking, warehouse automation etc., to boost delivery efficiency across multiple providers. Unified Logistics Interface Platform (ULIP) launched under National Logistics Policy aims to simplify logistics processes, improve efficiency and transparency and reduce logistics cost and time.[19]

08 In energy, double the share of renewables in power generation to 40 percent and become the world's cheapest producer of green hydrogen by producing five million tonnes per annum, by:

- Setting up a central renewable-energy (RE) infrastructure planning and project monitoring agency tasked with creating a database of land pockets (especially wasteland with RE potential), and facilitating land acquisition in coordination with states such as Gujarat, Rajasthan, Maharashtra, Karnataka, and Andhra Pradesh (that account for about 45 percent of total usable wasteland in India, with a combined solar power generation potential of 9,000 gigawatts), all aimed at cutting down the commissioning time for RE projects by 50 percent.[20]
- Setting up innovation clusters to facilitate shared infrastructure arrangements, a financial ecosystem, R&D opportunities, prototyping and scaling of new energy technologies, such as developing novel chemistries for the storage of perovskites, thorium-based nuclear, and electrolysers, among others.
- Proposing market reforms to unlock RE demand in a variety of ways. These could include rationalising the tariff structure by enacting a time-of-day tariff or cost-reflective tariff, enabling open access to boost demand, fast-tracking electricity derivates and futures to push consumers towards green energy sources, and setting up capacity markets for conventional power plants.
- Ensuring a stable round-the-clock supply for the country by scaling up energy storage systems by 2030 to five times the current size via dedicated tenders, regulatory mandates, and feed-in tariffs (FiTs).

[19] Unified Logistics Interface Platform (ULIP) receives tremendous response as 13 organisations sign Non-Disclosure Agreement (NDA) to access data on ULIP, Press Information Bureau, October 2022.
[20] "Vision 2047," Ministry of New and Renewable Energy (MNRE).

09 **In water, grow the percentage of households with tap water connections to 100 percent,[21] significantly increase the percentage of wastewater treatment from 30 percent to 100 percent, and reduce the use of non-revenue water, by:**

- Establishing a market-making body that could aggregate demand across urban local bodies (ULBs). This body (possibly under the Jal Shakti ministry) could also act as a credit intermediary to ease the cash crunch often faced by ULBs and create standardised bidding documents for municipal water treatment through PPPs to boost water treatment rates.
- Boosting the adoption of advanced zero-liquid discharge (ZLD) and water re-use technologies in water-intensive industries (such as tanneries and textiles) and developing domestic-supplier or start-up capacity to use low-cost technology, such as desalination and microbial fuel cells, for the supply and treatment of water. Technology could also be used to monitor the water-supply network to detect leaks.
- Promoting water-efficient agricultural practices, such as the establishment of an agriculture water-sustainability mission under industry bodies to drive the development and adoption of water-efficient germplasm, shift the acreage towards alternative crops, like millets (driven by the marketing and development of new food categories), and encourage a wider adoption of micro-irrigation.

10 **In education, improve the higher-education gross enrolment ratio to 60 percent and the student–teacher ratio to 1:15 in primary schools and 1:20 in higher grades by:**

- Developing a student-centric education model that incorporates design thinking (such as role playing), practical apprenticeships, and vocational models for grades 6 to 12 into the existing curriculum to align skills attainment with industry needs.
- Enhancing digital and physical infrastructure, ensuring access to digital tools in all schools, improving access to low-cost digital solutions, introducing modernised ways of learning (such as augmented reality (AR) and gamification), and integrating predictive data solutions to map learning outcomes.
- Enabling faculty training across global universities to deliver a high-end teaching quality, equipping higher education institutions with the latest technologies, building accelerated career-progression models, and creating a network of schools for peer learning.

In addition to these ten priorities, India Inc. could seed emerging technologies and business models to stay ahead of the innovation curve, growing the country's share of the global space-tech market to 10 percent, and increasing the gaming market to nearly $20 billion by 2030.[22,23] This could be achieved by:

- Enabling private participation in the space sector, including space object registration, unmanned aerial vehicles, geospatial data guidelines, and enabling private start-ups to use the Indian Space Research Organisation's infrastructure at scale.
- Scaling up investments in next-generation technology (for example, metaverse gaming and retail experiences) through increased R&D and innovation competitions for autonomous vehicles (such as the DARPA Grand Challenge in the United States), space exploration (Ansari XPRIZE), and marine energy (Scotland's Saltire Prize), as well as acquiring cutting-edge IP through programmatic mergers and acquisitions.

[21] Jal Jeevan Samvad, National Jal Jeevan Mission, May 2022.
[22] Shine Jacob, "How SSLV could bump up India's share of international space economy to 10%," Business Standard, Updated on August 21, 2022.
[23] "Leveling up: India's gaming market 2021," Lumikai, November 2021.

Turning India's vision into a reality

To achieve India's Century ambitions, India Inc. would need to strengthen four important capabilities and prioritise them over the next 12 to 18 months.

Increasing India's innovation quotient

India has made progress on innovation and has jumped from 81 to 41 in World Intellectual Property Organization (WIPO) Global Innovation Index rankings.[24] To know where they stand as innovators, companies can assess their "innovation quotient" (IQ). A multi-year platform newly launched as part of India's Century initiative, the Innovation Quotient Diagnostic, benchmarks company readiness, strengths, and execution capabilities for innovation. It generates relevant, company-specific insights to help leaders strengthen their company's innovation capacity in line with best practices of global frontrunners. In the first edition of IQ rolled out more than 150 respondents, Indian companies demonstrate strengths in focus on consumer, ability to scale optimised offerings and internal idea sourcing. There is potential to strengthen areas such as using quantified metrics and creating accountability, strengthening project governance, adopting risk mitigation practices, differentiating priorities and sourcing external ideas.

Sector-focused innovation clusters could also enhance the environment for innovation –economic hubs where capital, expertise, and talent collaborate on developing new or nascent technologies, industries, and ways of doing business.

As part of the India's Century initiative, nine clusters are planned across clean energy, smart mobility, water adequacy, life sciences, digital frontiers (metaverse, AI/ ML etc.), electronics, space technology, next-gen materials, and quantum computing. The first such cluster is being formed in the clean energy sector. As a partnership between industry, academia, and government, this cluster would focus on alternative energy storage solutions, improved technologies for lower-cost production and transportation of green hydrogen, decarbonisation in high-emission sectors, and more.[25]

This could be followed by smart-mobility and water-adequacy clusters.

Scaling up India's SMEs to grow 1,000 mid-sized and 10,000 small firms into global challengers

India has a "missing middle": a dearth of mid-sized firms that typically grow into formidable competitors for large companies.[26,27] India's peer emerging economies have more than double the number of mid-sized and large firms per trillion dollars of GDP than India.[28,29] India needs to nurture about 10,000 small firms to become mid-sized to bridge this gap, and about 1,000 mid-sized firms to become large ones by 2030.

To grow into global challengers, these firms require easier access to low-cost capital, simpler one-stop processes to start and run their businesses, and support for resources they cannot always afford to hire, such as in-house lawyers and company secretaries.

India's small and mid-sized companies would need to be able to access more than $800 billion in capital. Supportive schemes, such as leveraging an AA framework, could enable financial institutions to build digital lending solutions for MSMEs, with a focus on small-ticket loans, in conjunction with the open credit enablement network (OCEN) protocol. This could be further supported by the continuation of government credit guarantee schemes for MSMEs. Schemes such as the Emergency Credit Line Guarantee Scheme, the Credit Guarantee Fund Trust for Micro and Small Enterprises, and Pradhan Mantri MUDRA Yojana could underwrite risks for lenders.

In addition, policy makers could create state-specific, one-stop-shop portals for small and medium enterprises (SMEs) to make it easier for them to comply with all business processes, such as Singapore's GoBusiness platform that streamlines over 300 government-to-business services.[30]

Small businesses can integrate with Open Network for Digital Commerce (ONDC) or Government e-Marketplace (GeM) to access new markets and suppliers, and leverage digital solutions to enhance customer experience and optimise operations.[31] Such supportive measures could scale up the GDP contribution of SMEs from 30 percent to match the global 50 percent.[32] This could raise the number of mid-sized firms to challenge larger companies, especially in manufacturing, trade, construction, and real estate, which contributed around 40 percent to India's GDP in 2020 and whose SME segments have a high potential to scale up.[33]

[24] Global Innovation Index assesses the strength of innovation ecosystems using indicators from institutions, human capital and research, infrastructure, market sophistication, business sophistication, knowledge and technology outputs, as well as creative outputs.
[25] The cluster's launch is being discussed with relevant stakeholders and is subject to approvals.
[26] Mid-sized firms are companies with revenue of $40 million to $500 million.
[27] Large firms are companies with over $500 million in revenue. Empirically, large firms in India are 11 times more productive than the overall economy. They are also more than twice as productive as mid-sized firms and their profitability is 1.2 times greater.
[28] Peer emerging economies include China, Malaysia, Thailand, South Korea, and Vietnam.
[29] India's turning point: An economic agenda to spur growth and jobs, August, 26 2020.
[30] "GoBusiness – A central touchpoint for government-to-business e-services," Singapore Government Portal, August 2022.
[31] For more, see the Open Network for Digital Commerce (ONDC) website.
[32] "MSMEs day 2020," World Trade Organization.
[33] "MSMEs to contribute 50% to India's GDP, provide cr jobs in 5 years: Gadkari," The Economic Times, Updated on July 5, 2019.

Empowering India's next generation of talent for a meaningful livelihood

India's growing workforce will need to have the relevant skills and talent for success in sectors that offer the greatest scope for employment and growth. Three key levers could be employed:

First, this could be achieved by bolstering foundational skills to match the requirements of high-potential sectors, such as banking, healthcare, IT services, and manufacturing. Central government, as well as state governments, could partner with the private sector to provide educational training, for example, on financial and basic technology literacy.

Second, large-scale skilling and reskilling the existing workforce would be vital – training academies could set up by industry bodies that provide standard certification programmes across job roles, for example, NASSCOM's FutureSkills programme that aims to upskill 400,000 IT employees in B2B companies by 2025.[34]

Finally, creating the future workforce would require modernised teaching methods, with a greater focus on practical apprenticeship. This could happen, for example, by using simulations, gamified modules, or live projects. Certification programs could be set up in high-growth topics, such as green manufacturing.

Shaping India into the preferred destination for global capital

India's push to unlock productivity and growth across sectors creates the need and opportunity for more foreign investment. Companies in the country depend heavily on bank lending, sourcing 68 percent of their money from banks compared to 31 percent for companies in the United States, for example.[35]

India could become a magnet for global capital and deeper capital markets are one way to achieve this. Companies could attract international investors with a broader set of products and services, such as high-rated ESG securities. Unicorns, start-ups, and unlisted companies could attract foreign currency funds through trading or initial public offers with securities listed on the GIFT/IFSC exchange. Additionally, industry bodies could accelerate market access for private companies by launching digital platforms (for example, Axial and iSTOX) that connect companies with institutional and accredited individual investors.

Policy makers, meanwhile, could support India's entry into the Global Bond Index, potentially unlocking foreign portfolio investment inflows of $40 billion.[36] They could also enhance efforts to make the business environment more investor friendly with a one-stop shop for clearances and approvals, similar to the efforts made by the Gujarat, Uttar Pradesh, and Karnataka states. At the same time, e-governance for businesses could be set up at the state level and files and records further digitised.

These initiatives could allow India to double its market capitalisation to GDP ratio, raise foreign investment stock to 70 percent of its GDP, and grow India's share of private investments across the Asia-Pacific region from the current 20 percent to around 30 to 35 percent.[37]

[34] Future skilling for the digital economy, NASSCOM, February 2020.
[35] Structural changes in banking after the crisis, Bank of International Settlements, January 24, 2018.
[36] "India: Primed for bond index debut," Morgan Stanley, October 13, 2021.
[37] UNCTAD (Foreign Direct Investment Stock), IMF (Portfolio Liabilities Stock) – used for calculating FDI and FPI stock respectively (for 2020).

Short-term actions

As India builds momentum towards its aspirations, the country could consider the following measures to action these pivotal changes in the next year:

- **Strengthen the digital landscape across high-potential sectors** with pilot initiatives such as, in healthcare, establishing "hospital of the future" with digital patient-flow management systems and centralised medical resource management platforms and in agriculture, piloting Agri Stack projects in key districts, focusing on the digitisation of farm-level data and financial services.
- **Catalyse innovation across India and accelerate entrepreneurship and breakthrough ideas by** rolling-out three innovation clusters across clean energy, smart mobility and water adequacy and expanding the Innovation Quotient Diagnostic to more companies to set innovation targets and monitor annual progress.
- **Mobilise efforts to design state-level priorities and actions** in line with the India's Century aspiration and their respective starting point. This could start with larger states such as Uttar Pradesh, Bihar, Madhya Pradesh and West Bengal that will have a large bearing on the ability to achieve the India's Century aspiration.
- **Accelerate the adoption of existing digital capabilities by** encouraging a 90 percent adoption rate of the GeM portal by FICCI member companies and complementing this by achieving a 100 percent registration rate on the Ayushman Bharat Digital Mission Healthcare Professionals Registry. Business accelerator programmes could be created to onboard MSMEs onto digital public platforms such as ONDC, with at least 100 member companies across the e-commerce, retail, logistics, and payments sectors.
- **Roll out structured training programmes and ventures** in collaboration with industry bodies and education technology (edtech) companies to provide an additional three to four million people with skills required for employment in high-demand sectors. Industry-wide taxonomy needs to be aligned on new concepts, such as green manufacturing and certification programmes that are recognised and promoted by the Apex industry alliances (for example, the Healthcare Sector Skill Council under the National Skill Development Corporation).
- **Drive water sustainability with industry campaigns for net-zero consumption commitments and adoption of water efficient practices such as ZLD technology, industrial water efficiency, water sustainability audits and certification programmes.**

India's aspirations for 2047 could be realised through inspired leadership from India Inc., careful management, and collective action (with regular check-ins) at an unprecedented scale to ensure that India adapts to the world's rapidly changing realities.

01

The pathway to prosperity by 2047

The needs and desires of India's economy and people push and pull in multiple directions. Growing cities and urban populations demand a rapid pace of infrastructure development to ensure basic resources for all, which in turn puts a strain on the already burdened environment. The public and private sectors, while continuing to strengthen traditional industries, are also looking to fire innovation in sunrise sectors such as biotech, space-tech, next-gen materials and metaverse technologies. Poverty and prosperity co-exist in a country of economic disparities.

As this India draws closer to completing a century of independence, a pathway to more broad-based prosperity requires balancing aspirations across growth and sustainability and inclusion for a billion-plus people.

Three imperatives could set India on this path – gainfully employing the growing working-age population, building a diverse workforce for a more inclusive economy, and focusing on sustainability.

Provide gainful employment for the 600 million Indians who would make up 20 percent of the world's working-age population by 2047.

Despite rapid population growth over the last decade, India's workforce has remained at 470 million,[38] and the country's formal labour force participation has dropped further below the global average of about 66 percent.[39] Labour productivity in agriculture has seen accelerated growth since the early 2000s, prompting waves of workers leaving agriculture for other jobs – which are not in sufficient supply.

A key driver for a sustainable GDP growth of 7.5–8 percent could be a successful transition from employment in agriculture to other parts of the economy. This transition would require almost doubling the current number of non-farm jobs by adding 220 million by 2047. At least 90 million new non-farm jobs would be needed by 2030. A third of these will be knowledge-intensive jobs, led by education, healthcare, and professional services. About 25 million would be labour-intensive jobs, led by manufacturing and construction.[40,41]

In sectors like agriculture and construction, the biggest opportunity is in upgrading the quality of existing jobs and adding employment opportunities related to supporting industries. For instance, in agriculture, exports could be boosted by shifting focus to value-added processing instead of directly exporting commodities, thereby creating jobs, while in construction, services related to building more renewable energy infrastructure and lower-cost housing could spur demand.

The economic performance of states and territories in India varies significantly. Higher-income states, such as Maharashtra, Gujarat, Kerala, and Delhi, are growing at a faster rate than lower-income states, such as Bihar, Uttar Pradesh, West Bengal, and Madhya Pradesh (Exhibit 2). Several factors contribute to these differences, including dominance of certain industries, labour mobilisation, labour productivity, natural-resource endowments, urbanisation, educational infrastructure, and regulations. For example, in Bihar, traded activities account for less than 20 percent of all jobs and wages paid, while in Gujarat, this share is about 50 percent for payroll and above 40 percent for employment.[42] Similarly, agriculture accounts for more than 30 percent of all jobs in four states but less than 10 percent in more than 20 states and territories.[43]

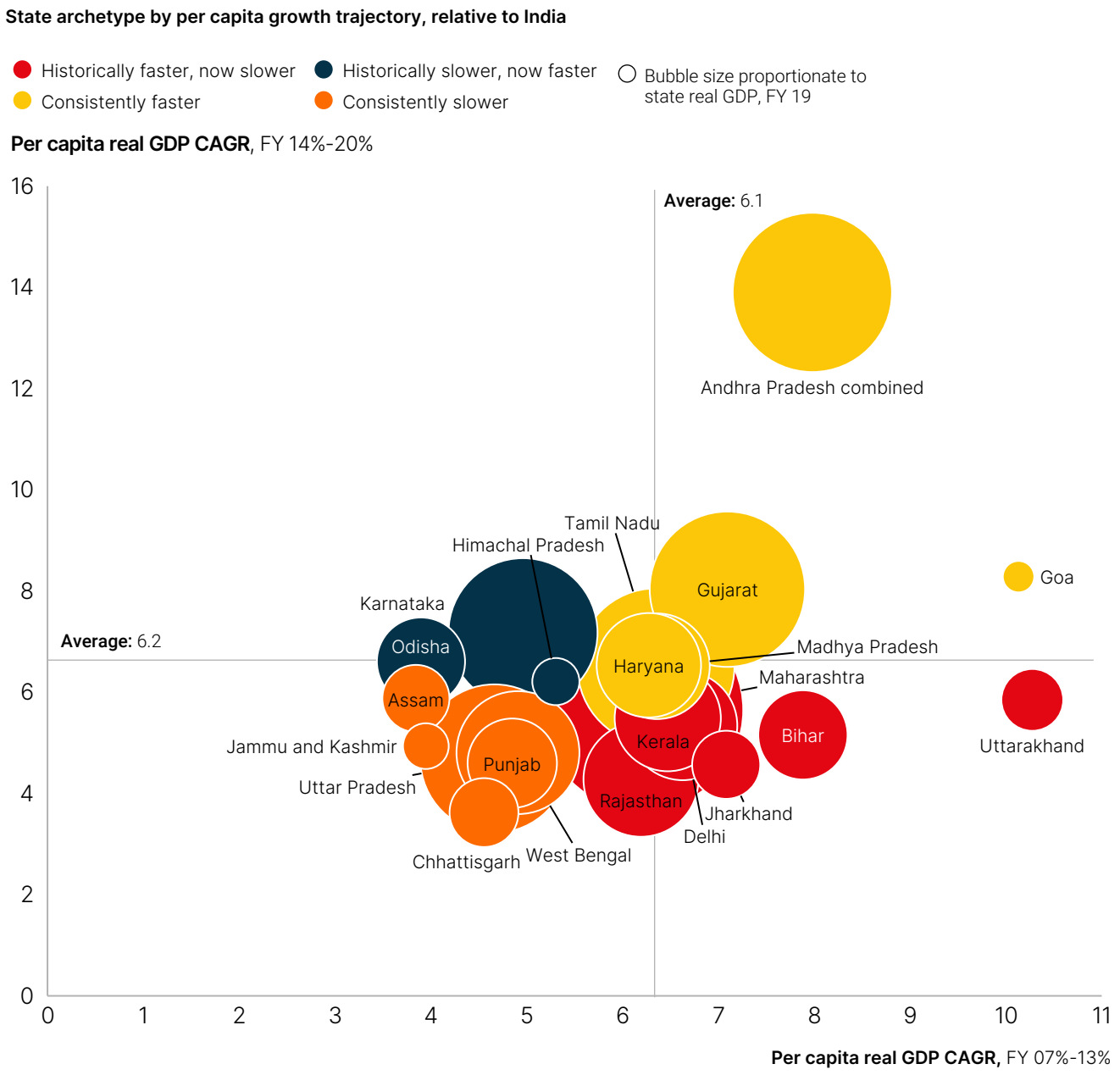
Urbanisation also plays a key role in the economic discrepancy between regions. While urban districts make up only a third of all districts in the country, they account for more than 55 percent of all wages paid in India and about 45 percent of all jobs. If growth rates continue along their historical trajectories, five states – Maharashtra, Gujarat, Karnataka, Tamil Nadu, and Andhra Pradesh – are together expected to contribute about 50 percent of India's GDP by 2030 (compared to 47 percent currently), despite employing only 35 percent of the labour force.[44]

If population growth rates continue along their current trajectory, states that have lagged in terms of economic development – primarily northern states, including Uttar Pradesh, Bihar, Madhya Pradesh, and West Bengal – will be home to most of the country's population (and workforce). These states would therefore need to boost their economic performance to meet the needs of their growing population and catch up to the more affluent states. This can be achieved in two ways: first, by creating enabling conditions for existing high-productivity enterprises to flourish; and second, by identifying new champion sectors to propel growth.

[38] Periodic labour force survey, 2020.
[39] International Labour Organization, ILOSTAT database. Data as of June 2021.
[40] India's turning point: An economic agenda to spur growth and jobs, McKinsey Global Institute, August 26, 2020.
[41] Calculation of estimated labour force in 2047 using India's population projection (UN WPP), historical average unemployment rate, National LFPR and female LFPR assumptions. China case-study to estimate India's agriculture employment share in 2047, in turn giving non-farm job employment requirement by 2047 (China chosen as it has a comparable population size, early economy demographics and growth trajectory).
[42] Competitiveness roadmap for India @100, Institute for Competitiveness, July 2022.
[43] Ibid.
[44] State-sector wise GDP projected on FY20 base (RBI) and adjusted to FY22 national GDP using sectoral GDP growth rates to arrive at FY30 GDP by state. Historical state-wise employment growth rates obtained using NSS, PLFS data, used to project state-wise employment forward to 2030.

Exhibit 2[45]

Economic performance varies significantly across Indian states and territories.



[45] GSDP data from RBI handbook of statistics on Indian economy.

Create an inclusive economy with universal access to basic services and a diverse workforce.

Ensuring access to basic services (food, shelter, education, and healthcare) and creating a more diverse workforce can drive increased productivity and prosperity for all. However, at least 300 million Indians currently lack access to basic services, putting them below the poverty line.[46] Other external agencies estimate India's female labour-force participation rate at about 20 percent[47] and this figure varies markedly across states (Exhibit 3). Increasing female labour-force participation to around 45-50 percent (closer to global benchmarks) by 2047 would bridge the gender gap at the workplace.[48]

Other, non-GDP-related dimensions of well-being are also significantly different across states and territories. For instance, access to social resources is widely curtailed, geographically, since the majority of India's top universities are located in the country's six wealthiest states and doctors are concentrated in urban areas, with only six states served by more doctors than the World Health Organisation's guideline of 1 doctor per 1000 people.[49]

Closing the gender gap would be key to boosting economic inclusivity and four main interventions could help in this regard: improving access to basic amenities, such as water, electricity, and childcare; increasing the number of non-farm jobs and offering incentives to support more women entrepreneurs; providing women with skills training and education; and bolstering gender diversity policies and practices in private-sector organisations (Exhibit 4).

Focus on sustainability

India has ranked seventh in the world among countries most affected by climate change,[50] and is increasingly likely to suffer heatwaves and falling crop yields. India's industry leaders and policymakers could work to cut CO2 emissions by 80 percent to achieve the country's stated goal of net zero by 2070.[51] The country would need to provide clean water for all through widespread interventions.

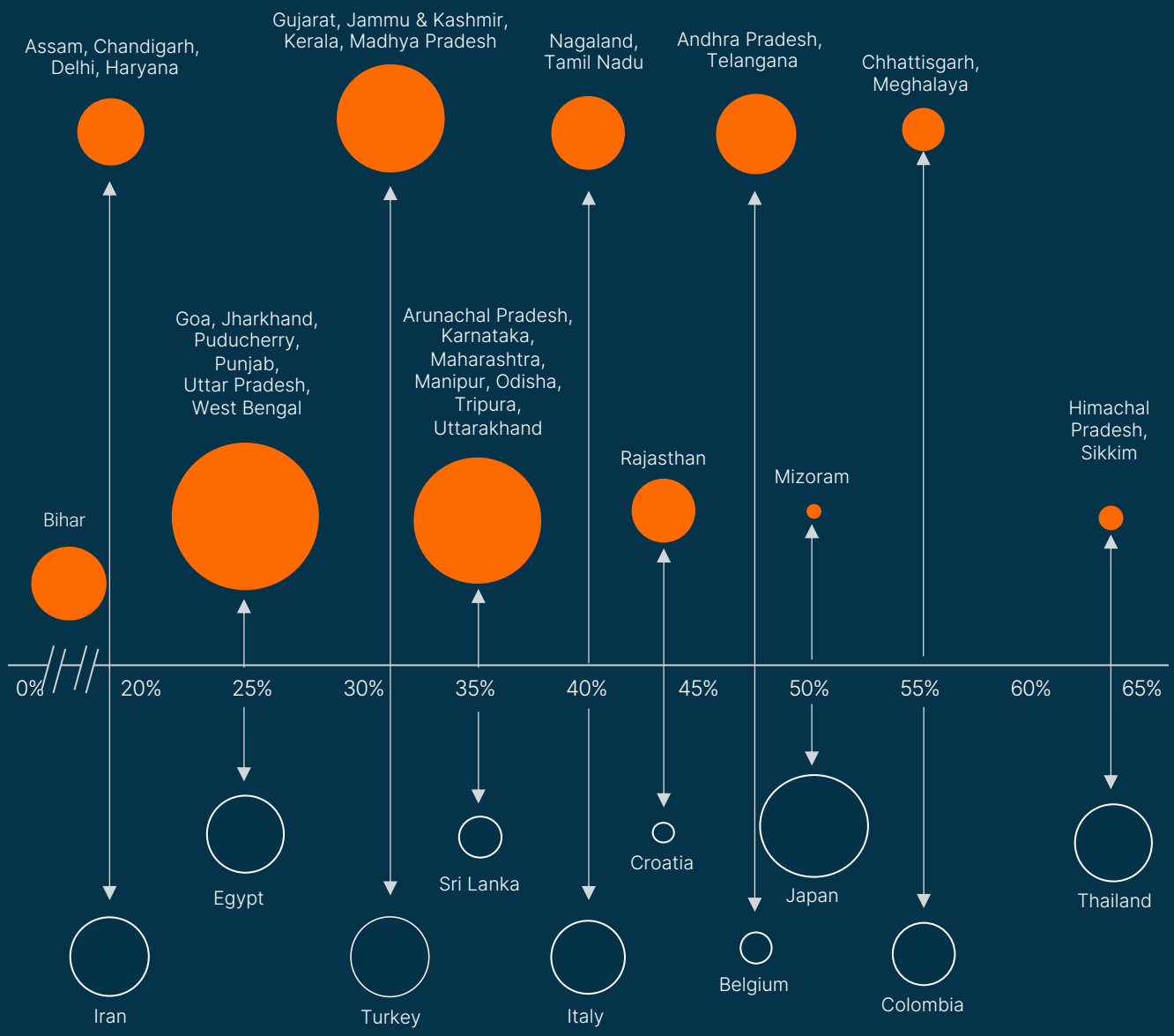
This paper looks at how to make progress towards sustainability goals in subsequent sections with actions that can be taken by India Inc. in this regard.

[46] India and the MDGs: Towards a sustainable future for all, United Nations Economic and Social Commission for Asia and the Pacific, February 2015; National multidimensional poverty index: Baseline report, NITI Aayog, November 2021.
[47] "Female labor force participation rate across India from 2011 to 2021," Statista, October 2022.
[48] McKinsey analysis. Leveraging benchmarks of Global GDP per capita peers for India in 2047.
[49] McKinsey analysis. Calculating staffing ration of comprehensive medical centers (CMC) and comparing across urban and rural regions.
[50] David Eckstein, Vera Künzel, and Laura Schäfer, Global climate risk index 2021: Who suffers most from extreme weather events? Weather-related loss events in 2019 and 200-2019, Germanwatch, January 2021. The top five countries were Mozambique, Zimbabwe, The Bahamas, Japan, and Malawi.
[51] Rajat Gupta, Shirish Sankhe, Naveen Unni, and Divy Malik, Decarbonising India: Charting a pathway for sustainable growth, McKinsey, October 2022.

Exhibit 3

On average, female labour-force participation is higher in the southern and western states than in the northern and eastern states.

Labour-force participation rate, female
Percent



Source: McKinsey Global Institute: The Power of Parity

Exhibit 4 [52]

Four key actions could increase overall female labour-force participation to 45%-50%.

Not exhaustive (Detailed in sector specific unlocks later)

Unlocks	Key action items and implications
Access to basic amenities	• Improve access to basic amenities such as water, electricity, LPG connections, affordable childcare, etc., particularly in states with poor infrastructure (e.g., Rajasthan, Jharkhand, Bihar, Maharashtra) to drive women's employment rate and overall wages.
Higher non-farm job opportunities	• Increase non-farm jobs opportunities (overall ~90mn jobs targeted by 2030), especially in sectors with a higher propensity to recruit women such as manufacturing (~11mn jobs), labour intensive (~22mn jobs), knowledge intensive sectors such as IT services, education and healthcare (~31mn jobs)[3] by sector-specific unlocks.[4] • Scale India's MSMEs to grow 1,000+ midsize and 10,000+ small companies into global challengers (e.g., by easier access to low-cost capital, simpler one-stop processes, supportive policy reforms) to generate women employment opportunities in low access areas and build more women entrepreneurs by providing innovative financial products, financial schemes (e.g., MUDRA), etc.
Empower next-generation women workforce by talent and skilling initiatives	• Build skillset to boost employability across high potential sectors.[1] Close gender gaps in secondary/tertiary education across states in India (especially Bihar, UP, MP, Andhra Pradesh); accelerate roll out of digital literacy initiatives (e.g., digitally empowered ASHA workers to deliver higher quality primary care) to improve quality and opportunity for flexible and remote working; partner with government and various industry bodies (e.g., FICCI, AMFA) to drive skilling/reskilling initiatives by improved learning infrastructure and modernized learning methodologies. • Promote dedicated training programs for women entrepreneurs in supply chain and sales and distribution channels e.g., Unilever's Shakti program has trained 70,000+[6] rural women as micro-entrepreneurs, and Walmart has training programs for female farmers. • Expand the scope of existing government skilling institutes (e.g., Women Industrial Training institutes, National Vocational Training Institutes) to launch multiple women-centric training programs at flexible hours to ensure a higher participation rate.
Strengthen gender diversity policies at workplace	• Step up gender diversity policies and practices in private sector organizations e.g., invest in high-quality employer-provided childcare and best practices, health insurance, improve maternity leave policies, safe transport, POSH[2] training, drive campaigns to recruit, retain, promote and develop more women employees, awareness programs for inclusivity, equal pay/working conditions/opportunities, etc.

1. Banking, capital markets, manufacturing, IT services, healthcare, logistics and infrastructure 2. Prevention of sexual harassment 3. Action oriented unlocks are listed in detail in respective sectoral unlock deep dives. 4. National digital health mission 5. McKinsey Global Institute: India's turning point (2020) 6. McKinsey Global Institute: The Power of Parity Asia 2018

[52] The power of parity: Advancing women's equality in India, McKinsey Global Institute, November 1, 2015; India's turning point: An economic agenda to spur growth and jobs, McKinsey Global Institute, August 26, 2020.

Building on these three imperatives would boost economic growth and make it more well-rounded.

Historically, India has grown at a GDP growth rate of 6.1% over the past 20 years. Continuing on this trajectory would result in a ₹ 1040 lakh crore economy, in terms of real GDP, by 2047.[53] Every additional percentage point of growth above this growth rate will add around 300 lakh crore to India's economy. However, realising the aspiration of reaching 60 crore jobs and ₹ 10 lakh per capita income by 2047 would likely require the Indian economy to grow at 7.7 percent annually,[54] three times the global growth rate.[55] Achieving this level of growth[56] would likely make India a ₹1,500 lakh crore[57] economy, in terms of real GDP, by 2047. This would mean that India could be close to becoming a high-income nation, with a per-capita income of about $12,000.[58]

Some states are expected to be more adversely affected than others, especially Rajasthan, Punjab, Haryana, and Uttar Pradesh – together accounting for 27 percent of the country's population – which would require urgent intervention.

Many states in India have economies as large as major countries (Maharashtra's GDP equals that of the Netherlands, Karnataka's is the same size as Poland's, and Gujarat's is equal to Thailand's).[59] As such, state governments would need to set their respective visions and blueprints to address pro-growth priorities. The vision and blueprint would need to include a basic set of reforms each state has in common, and which align with the central government. These could include power-sector reforms or increasing the ease of doing business while making choices around which frontier business opportunities could be growth priorities. The choices would vary by state depending on local endowments, such as agricultural resources, educated professionals, and land close to ports. They would also depend on the distance of the state from the productivity frontier and the urgency of bridging the gap, for example, in areas like power-sector distribution losses, logistics cost, and the quality of urban infrastructure.

Table 1: India's 2047 GDP estimates for various growth scenarios

Average growth rate from 2022-47	Real GDP	Nominal GDP[d]
Scenario 1: at 5.2 to 5.4% growth rate per annum[a]	₹840 lakh crore (USD 11 trillion)	₹3,200 lakh crore (USD 23 trillion)
Scenario 2: at 6.1% growth rate per annum[b]	₹1,040 lakh crore (USD 13 trillion)	₹3,900 lakh crore (USD 28 trillion)
Scenario 3: at 7.7% average growth rate per annum[c]	₹1,500 lakh crore (USD 19 trillion)	₹5,600 lakh crore (USD 40 trillion)

Footnotes:
a. Basis growth rate estimates by reports from other external agencies (EIU, IHS Markit, OE).
b. Continuing on historical 20-year average growth rate.
c. Real-GDP growth rate to achieve India's Century aspiration of reaching 60 crore jobs and ₹10 Lakh per capita income.
d. Assuming 5.78% inflation and 2.27% exchange rate depreciation (basis historical 20-year inflation and exchange rate data for 2001/02 to 2021/22 from World Bank).

[53] Exchange rate ($1 = ₹79.50) on September 15, 2022, has been considered for analysis.
[54] Growth rate of 8.3% till 2030 and 7.4% thereafter till 2047.
[55] The world's average real-GDP growth rate between 2010-2021 was 2.8 percent. See "World economic prospects," Oxford Economics, 2021.
[56] Translating to $19 trillion real GDP (at 2021-22 prices) and $40 trillion nominal GDP in 2047.
[57] With expected inflation of 5.78 percent per annum and exchange rate depreciation of 2.27 percent per annum (basis historical 20-year inflation and exchange rate data for 2001/02 to 2021/22 from World Bank).
[58] World Bank 2047 high-income bracket definition (more than $12,500).
[59] RBI handbook of statistics.

02

India – potential and possibilities

To achieve sustainable, inclusive growth, India could build on its unique endowments, capitalise on trends that could drive growth, and address structural challenges that hinder economic development.

2.1 A strong starting point in India's endowments

A relatively young workforce, a strong presence in manufacturing, and a vibrant, growing digital economy could empower India to capture significant value pools (Exhibit 5).

India's young workforce: A potential talent factory for the world

Most advanced economies have rapidly ageing populations and are seeing a drop in fertility rates. By 2047, between 25 and 30 percent of the population in advanced economies is projected to be over 60 years old.[60] In sharp contrast, India's population is young and growing. In 2047, India is expected to be home to around 20 percent of the world's working-age population, able to meet the shifting global demand for products and services (Exhibit 6).

India could provide the world with labour, becoming a leading talent pool in many sectors at home and abroad including healthcare; science, technology, engineering, and maths (STEM); and professional services. This could be further strengthened if India fosters a socioeconomic environment that helps retain the best talent.

60 McKinsey analysis. Age bracket population data from the United National World Population Prospects for developed countries such as the United States, China, and countries in the European Union were used for analysis.

Exhibit 5

Three key endowments that could help India tap significant global value pools.

Global trends		Opportunities for India	
1 **Talent factory to the world**	**25-30%** Population in advanced economies expected to be >60 by 2047	Become leading global exporter of talent — e.g., in digital services, healthcare, STEM, and professional services	**~20%** India's share of world's working age population by 2047
			20% Annual growth rate of high-skilled[1] digital talent in India
2 **Manufacturing leadership, backed by shifting supply chains**	**$4-5tn** Expected shift in global trade flows by 2030	Boost India's share of global trade in key value chains, e.g., auto, electronics, chemicals and medical device exports by 2030	**$0.8-1.2tn** Potential value India could capture in from trade flow shifts by 2030
			~3x Increase in high-value manufacturing exports by 2030
3 **Digital economy to fuel massive digital consumption**	**$13-15tn** Expected increase in global GDP attributable to digital economy by 2030	Achieve global leadership as consumer and provider of digital products and services, and become world's largest exporter of digital content	**>10%** Share of global ICT spending by 2030 (2X current share)
			~$1tn Potential value creation attributable to India SaaS market by 2030

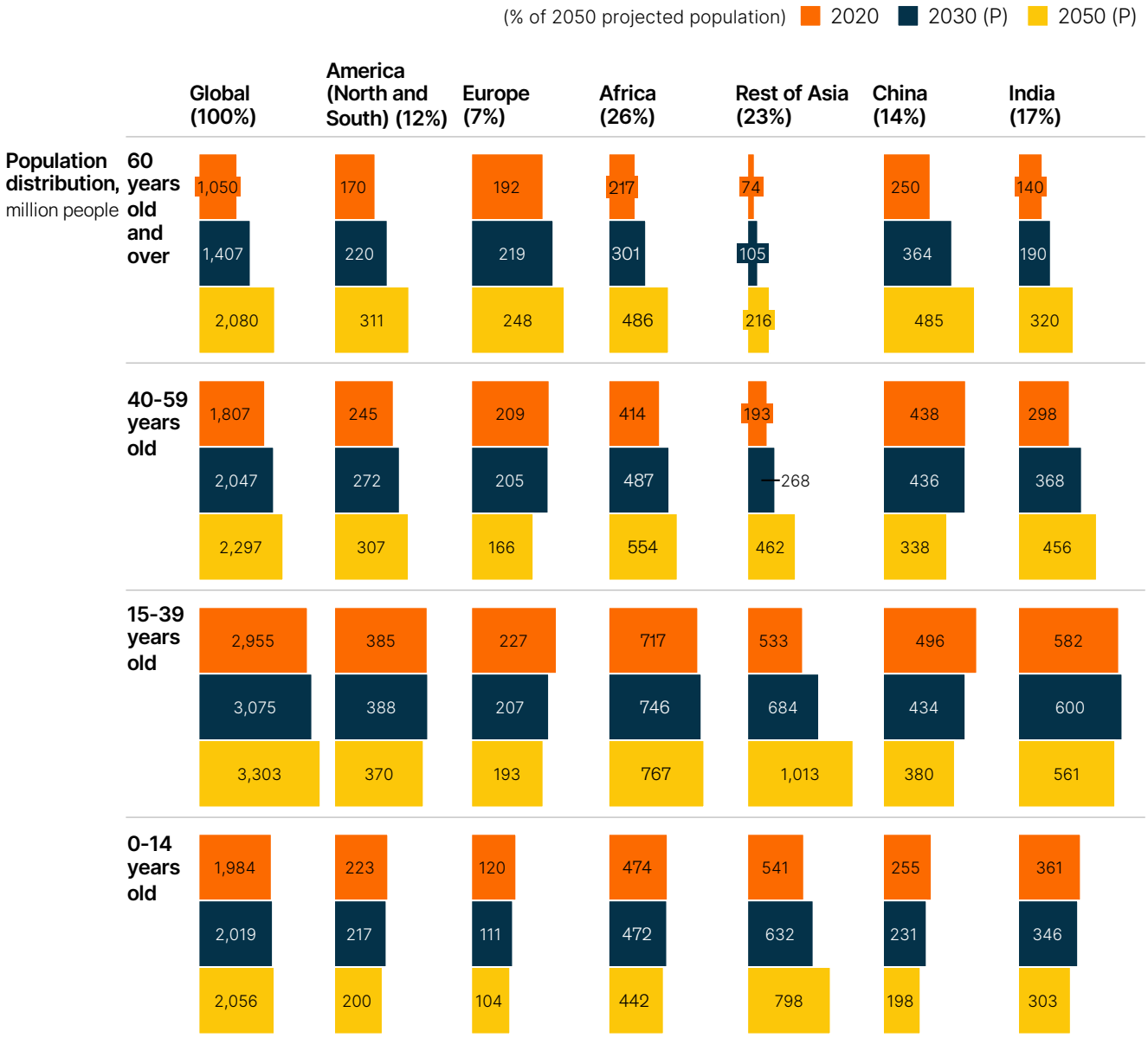
1. Consisting of workers skilled in AI and big data analytics, IoT, cloud computing, cybersecurity, robotic process automation (RPA), blockchain, AR/VR, 3D printing), and professionals employed in web and mobile development technologies

Source: Ministry of Electronics and IT (MeitY); The National Association of Software and Service Companies (NASSCOM); McKinsey Global Institute; McKinsey Sustainability

Exhibit 6

More than a quarter of the population in advanced economies is expected to be over 60 by 2050.

60+ have 2-3x healthcare, spend expected to drive significant growth in overall healthcare spending



Total population, million people	Global (100%)	America (North and South) (12%)	Europe (7%)	Africa (26%)	Rest of Asia (23%)	China (14%)	India (17%)
2020	7,795	1,023	748	1,341	1,822	1,439	1,380
2030 (P)	8,548	1,097	741	1,688	2,006	1,464	1,504
2050 (P)	9,735	1,188	710	2,489	2,249	1,402	1,639

Methodology:
Five-year age-band wise population projections (UN Population prospects) aggregated by region and desired age-bracket

Source: United Nations world population prospects

For example, India could become a global healthcare services provider. The aged in advanced economies are likely to have higher disposable incomes and double or triple the healthcare spend compared to today. India is currently tenth among the 46 countries considered in the Medical Tourism Index (MTI) 2020-21, which ranks countries based on their attractiveness for medical tourism.[61] It could pivot from being the "pharmacy of the world" to become the "hospital of the world", sought after for its cost-effective healthcare, by improving upon the current shortcomings in the sector. The healthcare sector could develop integrated ecosystems for comprehensive medical care, comprising both traditional players such as hospitals, diagnostic laboratories, and pharmaceutical companies, as well as non-traditional entrants, such as big-tech companies and new start-ups.

India has a reputation for low-cost medical-device innovation.[62] The healthcare sector can capitalise on this reputation by encouraging the production of class A and class B medical devices, with assistance from specialised laboratories and other support structures.

Manufacturing muscle: Leadership in global supply chains

With the COVID-19 pandemic highlighting the challenges of concentrated supply chains, companies worldwide are looking for alternatives to their primary suppliers that will ensure greater resilience. India could capitalise on this emerging opportunity and capture an increased share of key global supply chains, valued at between $800 billion and $1.2 trillion by 2030 (Exhibit 7).

India's industrial sector is particularly well-positioned to capture export opportunities in sectors such as automotive, electronics, semiconductors, chemicals, and medical devices. Labour costs in India are lower than in manufacturing peers such as Vietnam, Thailand, and China. India's manufacturing sector could also ramp up capacity, drawing on the comparatively high number of STEM graduates (2.1 million) that are produced annually. India's globally competitive strong stream of STEM graduates could help the country become a fast-growing hub for manufacturing research and development.[63]

[61] Medical Tourism Index 2020-2021: Global destinations; MedicalTourism.
[62] G Seetharaman, "How potential entrepreneurs can tap India's affordable medical devices market," February 26, 2017, The Economic Times.
[63] "India's tech industry talent: Demand supply analysis," NASSCOM, February 2022.

Exhibit 7

India could capture about $1 trillion in trade flows resulting from global supply chain shifts over next decades.

Low potential ● ◐ ● High potential

Potential to shift varies across sectors

	Total trade ($bn)	Annual exports that could shift geographies ($bn)	India potential (To capture shift)
Auto	1,730	349	
Electrical equipment	928	319	
Machinery and equipment	1,455	362	
Aerospace	333	110	
Semi conductors	995	184	
Communication equipment	673	363	
Chemicals	1,584	172	
Computer and electronics	708	247	
Medical devices	268	120	
Total	$18.0tn	$4.6tn (~25%)	~$ 1tn
	Total trade	Expected shift in trade flow	In sectors with potential to shift

India well placed to capture the shift in select sectors

PLI Incentives with planned outlay worth ~$25bn

Capabilities and skill pool

25% — Share of global science and engineering graduates; fast growing R&D hub for manufacturers

$500bn[1] — expected worth of good to be generated by 2026-2027 due to the initiative

India has the capability to ramp up manufacturing capacity and capture shift in trade flows

Lower cost labour market

Expertise in labour intensive manufacturing processes — Casting and forging; **Better quality** compared to other ASEAN peers

Low-cost labour — Lowest among its manufacturing peers — Vietnam, Thailand & China

India is already a leading exporter in sectors: Auto and components, Chemicals, Medical devices, Electronics

1. Ministry of Commerce estimates

Source: McKinsey Global Institute

Digital dynamics: Rapidly growing a large digital economy

By 2030, digitisation, automation, and artificial intelligence could make up around $13 trillion to $15 trillion (10 percent) of the global GDP.[64] Emerging developments, such as the metaverse, are expected to drive $4 trillion to $5 trillion in value across various consumer and enterprise use cases.[65] By 2035, the fifth-generation (5G) network is expected to enable $12 trillion to $13 trillion in global sales activity (around 5 percent of total global output).[66]

Enterprises and consumers are likely to intensify spending on technology from 5.5 percent of global GDP in 2020 to around 7.5 percent by 2030, creating opportunities for India in technology services, software as a service (SaaS), products, and consumer technologies.[67]

As the world moves towards the fourth industrial revolution, ten technologies have emerged that could reshape industries (Exhibit 8).

India is well-positioned to be at the forefront of these changes (Exhibit 9). With a growing workforce of skilled engineers (8 million to 10 million are expected to join the job market by 2030), India could become a digital services exporter to the world.[68]

The country has more than 650 million internet users and the world's cheapest data.[69] It is one of the largest and fastest-growing markets for digital consumers, with more than 200 million online shoppers expected to be added in the next four to five years.[70] India's online gaming and entertainment market could reach $5 billion by 2025.[71] The number of 5G users is expected to increase to 500 million by 2027.[72]

64 "Notes from the AI frontier: Modeling the impact of AI on the world economy," McKinsey Global Institute, September 2018.
65 Value creation in the metaverse: The real business of the virtual world, McKinsey, June 2022.
66 The 5G economy: How 5G will contribute to the global economy, IHS Markit, November 2019.
67 Future of technology: Winning in this decade, NASSCOM, February 2021.
68 Simon Kemp, "Digital 2022: Global overview report," DataReportal, January 26, 2022; Internet adoption in India, Kantar, June 2021.
69 Bharat 2.0 Internet Study, Nielsen, December 2021
70 E-commerce industry report, India Brand Equity Foundation, August 2022.
71 Dikshu Kukreja et al., "India's Nascent Gaming Industry on the rise," India Brand Equity Foundation, Jan 20, 2022.
72 Ericsson mobility report, Ericsson, June 2022.

Exhibit 8

Ten technologies set to transform the future of industries.

Industry-agnostic trends

1 Next-gen manufacturing... ... and process virtualisation

- Industrial IoT[1]
- Robots/cobots[2] / RPA[3]
- 3D / 4D printing
- Metaverse
- AR/VR
- Digital twins

$4-5tn

Metaverse value creation potential by 2030

2 Future of connectivity

- 5G and IoT connectivity

Up to 80%

of global population could be reached by 5G coverage by 2030

3 Distributed infrastructure

- Cloud and edge computing

>75%

of enterprise generated data will be processed at edge or cloud by 2025

4 Next-gen computing

- Quantum computing
- Neuromorphic chips (ASICs4)

>$1tn

value potential of quantum computing use cases at full scale by 2035

5 Applied AI

- Computer vision, natural language processing & speech technology

>75%

of all digital service touch points (e.g., voice assistants) will see improved usability, enriched personalization

6 Future of software / web

- Web 3.0
- Software 2.0

~30x

reduction in the working time required for software development and analytics

7 Trust architecture

- Zero-trust security
- Blockchain

~10%

of global GDP could be associated with blockchain by 2027

Industry-specific trends

8 Bio revolution

- Biomolecules/X-omics/ Biosystems
- Bio machines/Bio computing/Augmentation

9 Next-gen materials

- Nanomaterials, graphene and 2D materials, molybdenum disulfide nanoparticles

10 Future of Green tech

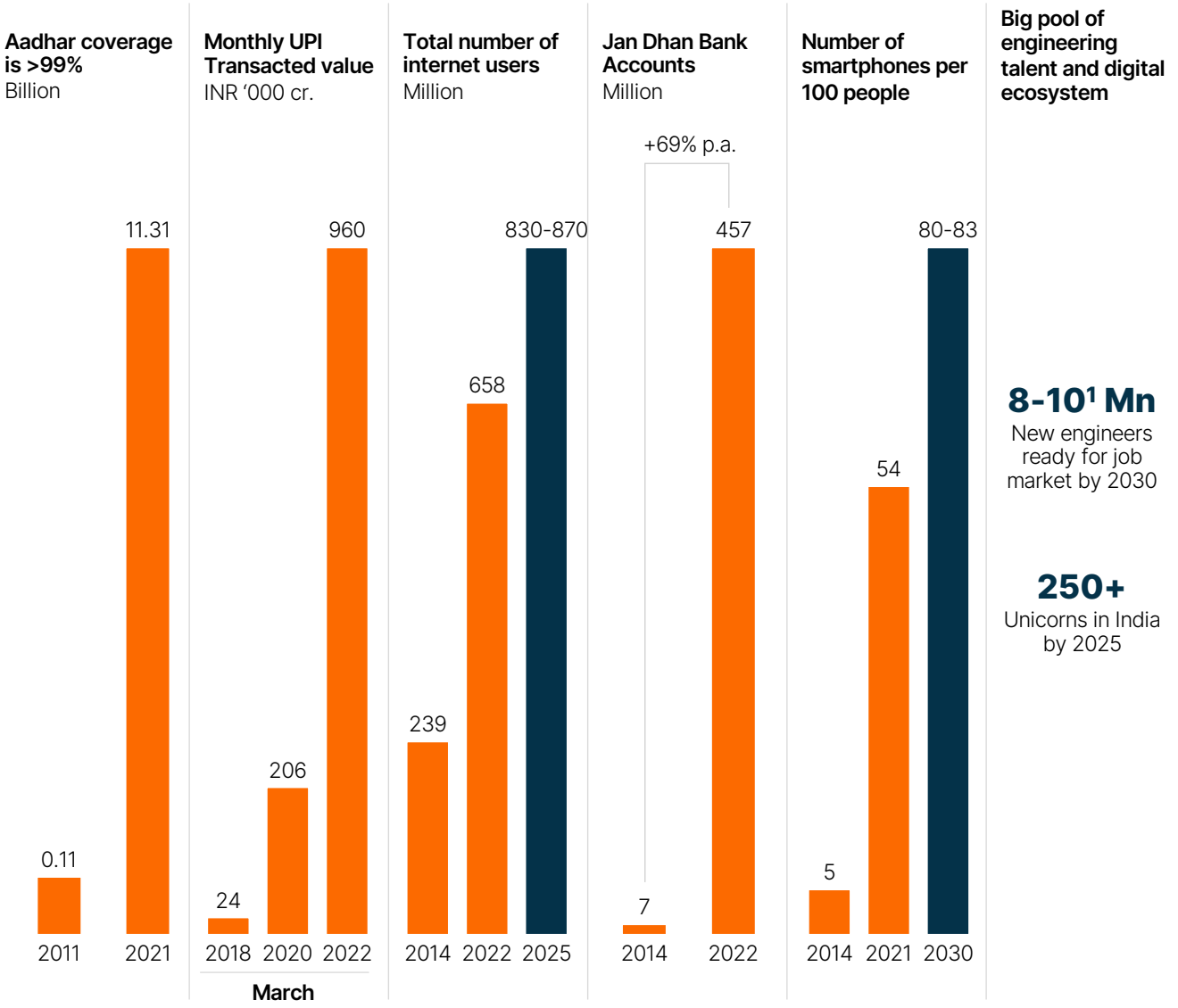
- Nuclear fusion
- Smart distribution/metering
- Battery/Battery storage
- Carbon neutral energy generation

1. Internet of things;
2. Collaborative robots;
3. Robotic process automation;
4. Application-specific integrated circuits

Exhibit 9

India is well positioned to generate economic value from digital opportunities and become digital services exporter to the world owing to:

- High digital penetration
- Large pool of engineering talent
- Strong digital startup ecosystem



1 **Methodology:** Historical year-on-year engineering graduates for 2012-20 obtained from AISHE. Growth-rate calculate between 2015-20 (reflective of recent downward trend in YoY engineering enrollment & graduates) and applied to project to 2030

Source: PMJDY, IBEF, UIDAI.gov, NPCI, ICUBE, Digital 2022: Global Overview Report, AISHE

2.2 Structural challenges

Although India has great potential, the country is facing several structural challenges that could hinder its economic progress.

- **Energy security and independence:** While India's cost of power generation is one of the lowest, the power cost to consumer is one of the highest in South Asia, and around three to four times higher than in peer economies.[73] The steady availability of low-cost power could help businesses grow, increasing the global competitiveness of India's micro, small, and medium enterprises.
- **Sufficiency and quality of physical infrastructure:** India could accelerate infrastructure development to keep up with the rapid pace of urbanisation. This includes road construction at a rate of around 100 kilometres a day, as well as speeding up the execution of major projects such as the Sagarmala waterways initiative, Bharatmala Pariyojna etc. This would help achieve India's target of reaching 8 lakh km of highways by 2047, up from 1.8 lakh km currently, to achieve a similar road network density to developed nations.[74]
- **Underdeveloped capital markets:** India received 20 percent of all private investment flowing to the Asia-Pacific region in 2021, second only to China.[75] However, its commercial borrowing rate is 500 basis points more than peer economies.[76] Lowering this cost could boost credit flows towards building world-class, export-oriented value chains. Indian household savings are almost entirely concentrated in non-financial market instruments — only 5.5 percent of the population invests in the Indian stock market, compared to 45.2 percent of Americans who invest in the US stock market.[77]
- **Access to quality healthcare, education, and nutrition:** The future generations of India will benefit tremendously from access to quality education, affordable healthcare, and good nutrition. For this to happen, India would need more doctors to offer adequate primary healthcare (from the current eight doctors per 10,000 people to 16–20 doctors per 10,000 people).[78] Around 3.3 million children in India are malnourished, of which 1.8 million are severely malnourished.[79] More than 50 percent of public-school students in class V are unable to read class II-level texts.[80] Future generations would also need more skilling vehicles – the United Nations ranks India 129th in skilling among 162 countries.[81]

Addressing these challenges would empower India's economic actors — workers, micro-entrepreneurs, small and large companies — to contribute to GDP growth and deploy their talent and resources more productively.

[73] Nantoo Banerjee, "Why are Indians paying three to four times the cost of generating electricity?," National Herald, July 25, 2020.
[74] "India is on track to have 1.8 lakh kilometres of highways and 1.2 lakh kilometres of rail lines by 2025," The Economic Times, August 22, 2022.
[75] Foreign Direct Investment and Portfolio Equity net inflows, World Bank.
[76] India's turning point: An economic agenda to spur growth and jobs, McKinsey Global Institute, August 26, 2020.
[77] Sunil Sanghai, "Indian capital markets during Amrut Kaal," The Economic Times, June 18, 2022.
[78] "Medical doctors (per 10,000 population)," World Health Organization, 2021.
[79] "More than 33 lakh children in India malnourished, 17.7 lakh of the severely malnourished: Govt data," Business Today, November 7, 2021.
[80] Annual status of education report (rural) 2018, ASER Centre, January 2019.
[81] Human Development Report 2020 – The next frontier: Human development and the Anthropocene, United Nations Development Programme, December 2020.


START
FINISH

03

Unlocking potential in key sectors: Ten priorities for India Inc.

Based on conversations with a cross-section of industry and business leaders this chapter identifies ten priority sectors that could significantly boost GDP growth and suggests growth-enhancing actions India Inc. could pursue for each sector over the next five to seven years. These ten sectors, listed below, would account for the bulk of job creation and productivity growth in India in coming years (Exhibit 10). While not exhaustive, the suggested actions for each sector could pave the way to a more sustainable, inclusive India by 2047.[82]

AGRICULTURE

Double exports to between $90 billion and $100 billion and food processing industry to $600 billion

HEALTHCARE

Double the number of doctors, nurses, and allied healthcare professionals per 10,000 people, reduce the share of out-of-pocket healthcare spend from around 48 percent to less than 30 percent, and become a "hospital to the world".

MANUFACTURING

Triple high-value exports from $140 billion to $400 billion, increase overall manufacturing productivity to five times the current figure, triple the number of large firms from 250 to more than 750, and drive down import manufacturing as a percentage of imports to 10–15 percent (compared to 25–30 percent today).[84]

EMERGING ENERGY

Double the share of renewables in power generation from 22 percent to 40 percent and become the world's cheapest producer of green hydrogen, producing five million tons per annum by 2030.[83]

FINANCIAL SERVICES

Double formal lending to micro, small, and medium enterprises (MSMEs) to 80 percent and cut the cost of commercial borrowing to align with global peers.

WATER

Increase households with tap water connections from 50 percent to 100 percent and treat 90 percent of wastewater (compared to 30 percent today) to ensure universal access to clean water.

INFORMATION AND COMMUNICATIONS TECHNOLOGY

Increase the share of the workforce trained in digital skills from the current 25–30 percent to 100 percent, grow India's share of global software as a service (SaaS) revenue to 4–6 percent, and strengthen India's position as the global factory for digital, cloud, and analytics.

INFRASTRUCTURE AND LOGISTICS

Reduce logistics costs from 14 percent to 8 percent of GDP, reduce infrastructure project cost overruns from 20 percent to less than 5 percent and increase skilled construction workers as a percentage of total workforce from less than 10 percent to more than 40 percent.

CONSUMER TECHNOLOGY

Increase e-retail transactors by about five times (from 162 million in 2021 to 770 million by 2030) and increase India's share of consumer spend in the digital, organised market from 27 percent in 2020 to 54 percent in 2030.

EDUCATION

Improve the higher education gross enrolment ratio (GER) to 50–60 percent (compared to about 27 percent today) and boost the student-teacher ratio to 1:15 at primary-school level and 1:20 in higher grades (compared to the current average of 1:26).

In addition to these ten priorities, India can leverage next-generation technologies by fostering seed incubators and markets to grow its share of the global space-tech market from 2 percent to 10 percent and boost its gaming market ten times to nearly $20 billion.

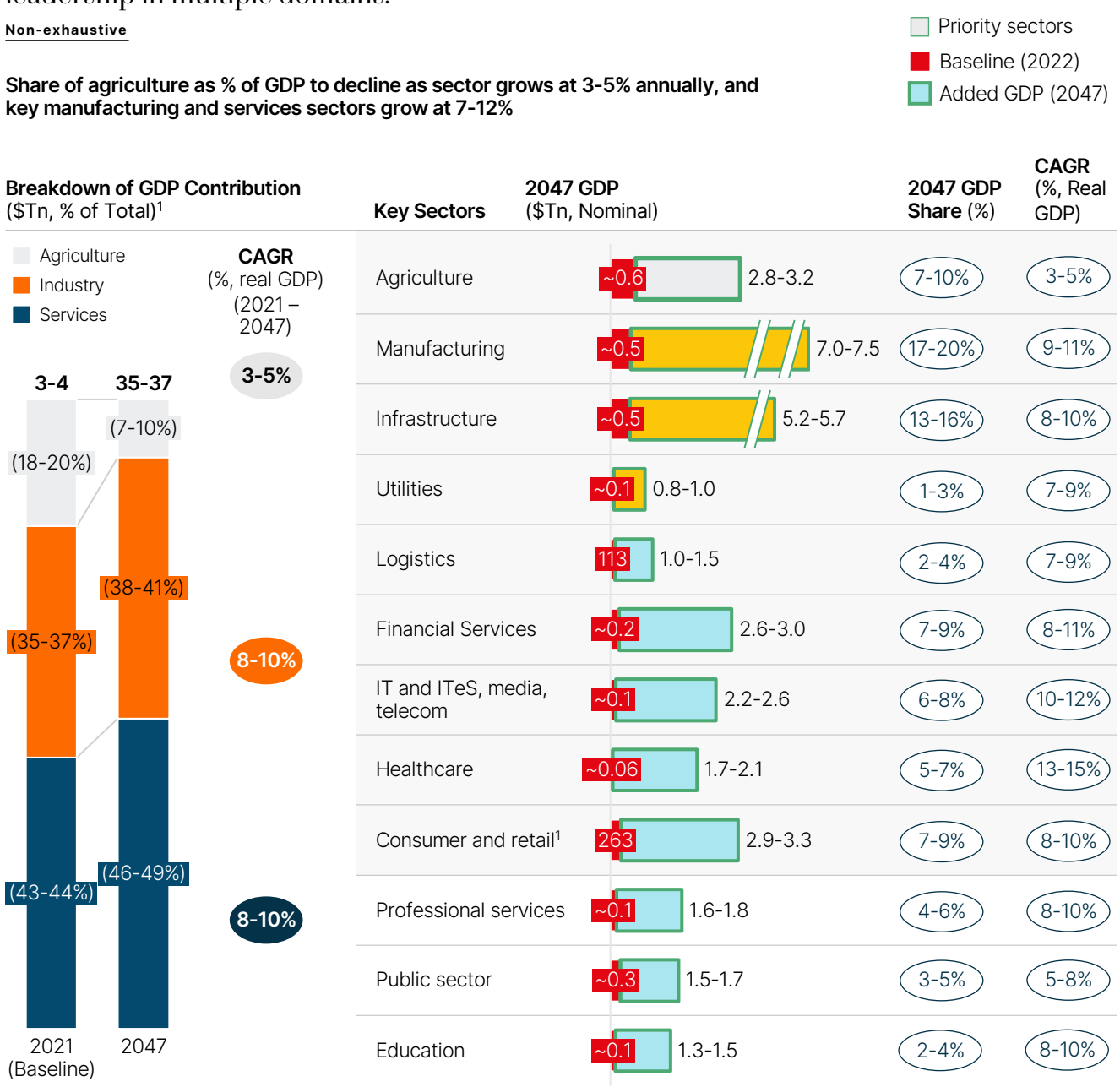
82 A more detailed set of aspirations and unlocks by sector appear on the India's Century microsite and will be tracked and updated each year. We will also add to the priorities for each sector and introduce priorities for additional sectors in the next phase of work.
83 Report on optimal generation capacity mix for 2021-30, a joint report by the Ministry of Power and the Central Electricity Authority, January 2020; India energy outlook 2021, Organisation for Economic Co-operation and Development, March 16, 2021.
84 India's turning point: An economic agenda to spur growth and jobs, McKinsey Global Institute, August 26, 2020.

Exhibit 10

Industry and services could grow at ~2x relative to agriculture as India ascends to global leadership in multiple domains.

Non-exhaustive

Share of agriculture as % of GDP to decline as sector grows at 3-5% annually, and key manufacturing and services sectors grow at 7-12%



Methodology: Sectoral growth rates projected basis employment and productivity growth rates during historic high-growth periods in India and peer economies (e.g., Korea, China etc)

- Recent (last 10-15 years) periods considered for tech-intensive sectors (e.g., IT and ITeS)
- Investments in healthcare and education likely to see non-linear returns by 2047 – aspiration for GDP contribution calculated by benchmarking against investment – GDP contribution ratios of global best-in-class peers
- Current sectoral GDP figures from MOSPI, IHS scaled to 2021/2022 GDP ($3.15tn); growth rates applied to scaled 2021/2022 GDP figures and 2047 figures scaled to overall ~35-37tn aspiration

1. Unlocks covered under consumer tech, manufacturing and logistics section

Source: 2021 GDP figures taken from IHS Markit; Ministry of Statistics and Programme Implementation (MOSPI)

The sections below identify the challenges facing each sector and suggest actions companies, industry bodies, and the government could take to spur growth in these economically important sectors.

3.1 Agriculture

India has a large and growing agricultural sector. India is the second-largest agriculture producer in the world, after China, and is the world's largest producer of milk, mangoes, bananas, papayas, and pulses.[85] The Indian agricultural sector's GDP has grown by about 5 percent over the last decade.[86] Productivity of agricultural workers has also grown by 9 percent over the last two decades.[87]

However, several factors affect growth — a lack of mechanisation and challenges around water stress, food spoilage, farmers' difficulty in accessing formal credit, and agricultural produce not being conducive to food processing. And even when states have abundant resources, many struggle to capitalise on this. For example, Bihar has a food-grain yield of about 2,300 kilograms per hectare, whereas Punjab has almost double, at about 4,500 kilograms per hectare.[88] Cold-storage capacity can also be a struggle, with most of the states unable to meet demand, which increases spoilage and reduces quality of produce for downstream food processing (Exhibit 11).

[85] "FAO in India," Food and Agricultural Organization of the United Nations; Prachi Gupta, "India is world's largest producer of mangoes, banana; check which other commodities make it to the list," March 5, 2019.
[86] Handbook of Statistics on Indian states 2021-2022, Reserve Bank of India.
[87] "FAO in India," Food and Agricultural Organization of the United Nations; Handbook of Statistics on Indian states 2021-2022, Reserve Bank of India
[88] Handbook of Statistics on Indian states 2021-2022, Reserve Bank of India

Overcoming these challenges could double India's food-processing industry's GDP from $300 billion in 2020 to more than $600 billion by 2030. It could also help India double its agricultural exports, increasing them by between $40 billion and $50 billion by 2030.[89]

Various measures can be taken to overcome the challenges facing the sector, including increasing farm mechanisation from 40 percent to 60 percent by 2030.[90] Increasing the adoption of precision farming — an agricultural-management concept based on observing, measuring, and responding to inter- and intra-field variability in crops — from the current 10 percent of farmers to nearly 60 percent by 2030 would boost efficiency and save money.[91] It would also cut food spoilage by more than 50 percent by 2047.[92] Adopting these practices while adhering to sustainability standards could result in an improvement in water-use efficiency[93] from 38 percent to about 60 percent by 2030, and reduce agricultural greenhouse-gas emissions by between 45–50 percent by 2047.[94]

India already has tailwinds that could boost its agriculture sector. These include a steadily growing consuming class and an increased spend on high-value foods such as fruits and vegetables, livestock, spices, and condiments. For farmers, the growing adoption of digital solutions and new practices (such as soil-health cards and remote sensing), the strengthening of market linkages (for example, the establishment of mega food parks and growth in food processing), and government schemes that prioritise sustainable agriculture are all growth tools.

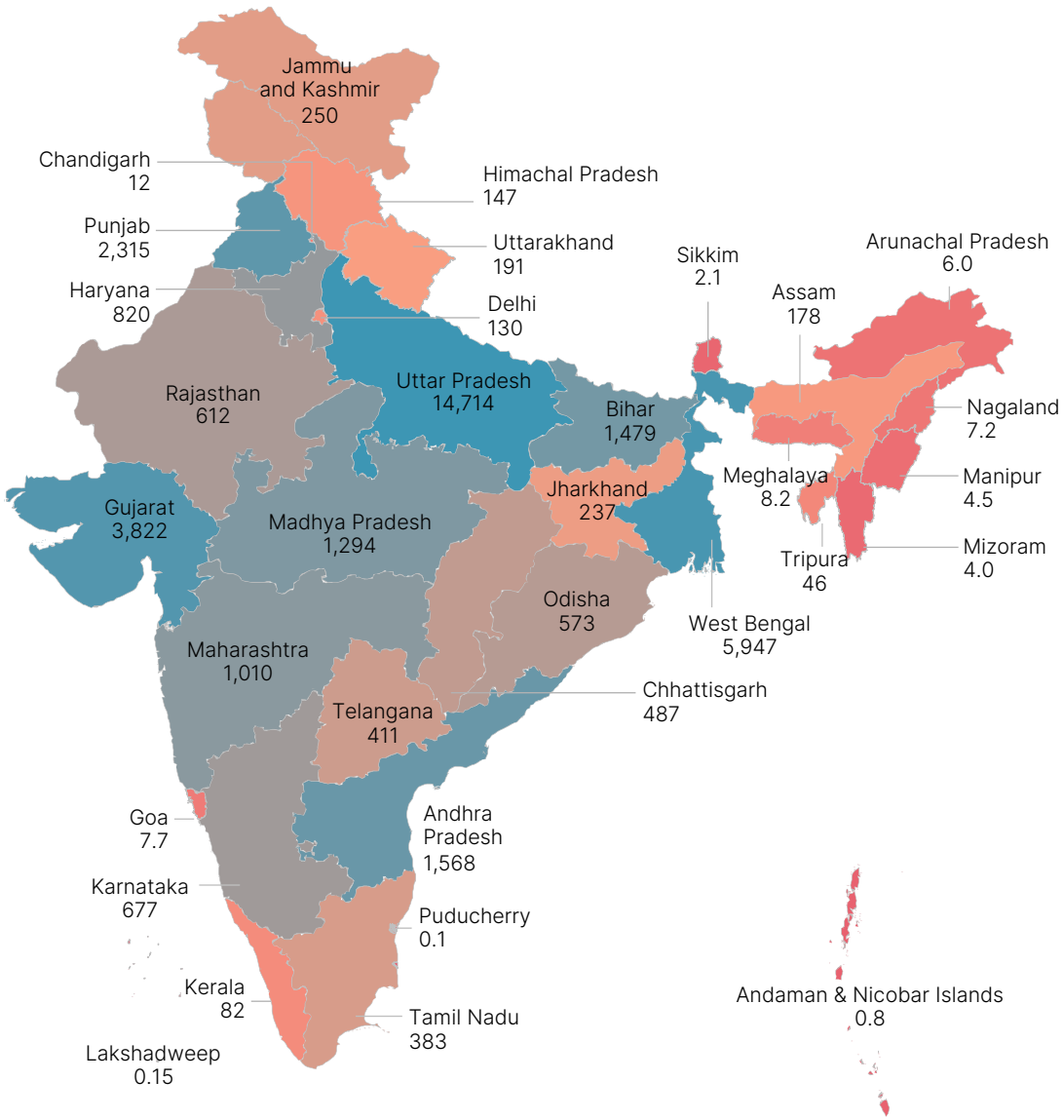
89 High-level expert group on sustainable finance, European Commission, July 3, 2020, finance.ec.europa.eu.
90 Farm mechanization, NABARD, December 2018.
91 India's turning point, an economic agenda to spur growth and jobs, McKinsey Global Institute, August 2020.
92 "FAO in India," Food and Agricultural Organization of the United Nations.
93 Water use efficiency is the ratio between effective water use and actual water withdrawal.
94 Water use efficiency, Ministry of Water Resources, RD & GR.

Exhibit 11

Few states have capitalised on their advantages to achieve higher productivity in agriculture and build downstream cold storages.

State-wise cold-storage capacity (metric tonnes)

- Uttar Pradesh is the leader by a large margin, driven by cold storage of potatoes
- Cold storage in Gujarat, Andhra Pradesh, Madhya Pradesh, West Bengal, and Maharashtra are driven in part by the food-processing industry

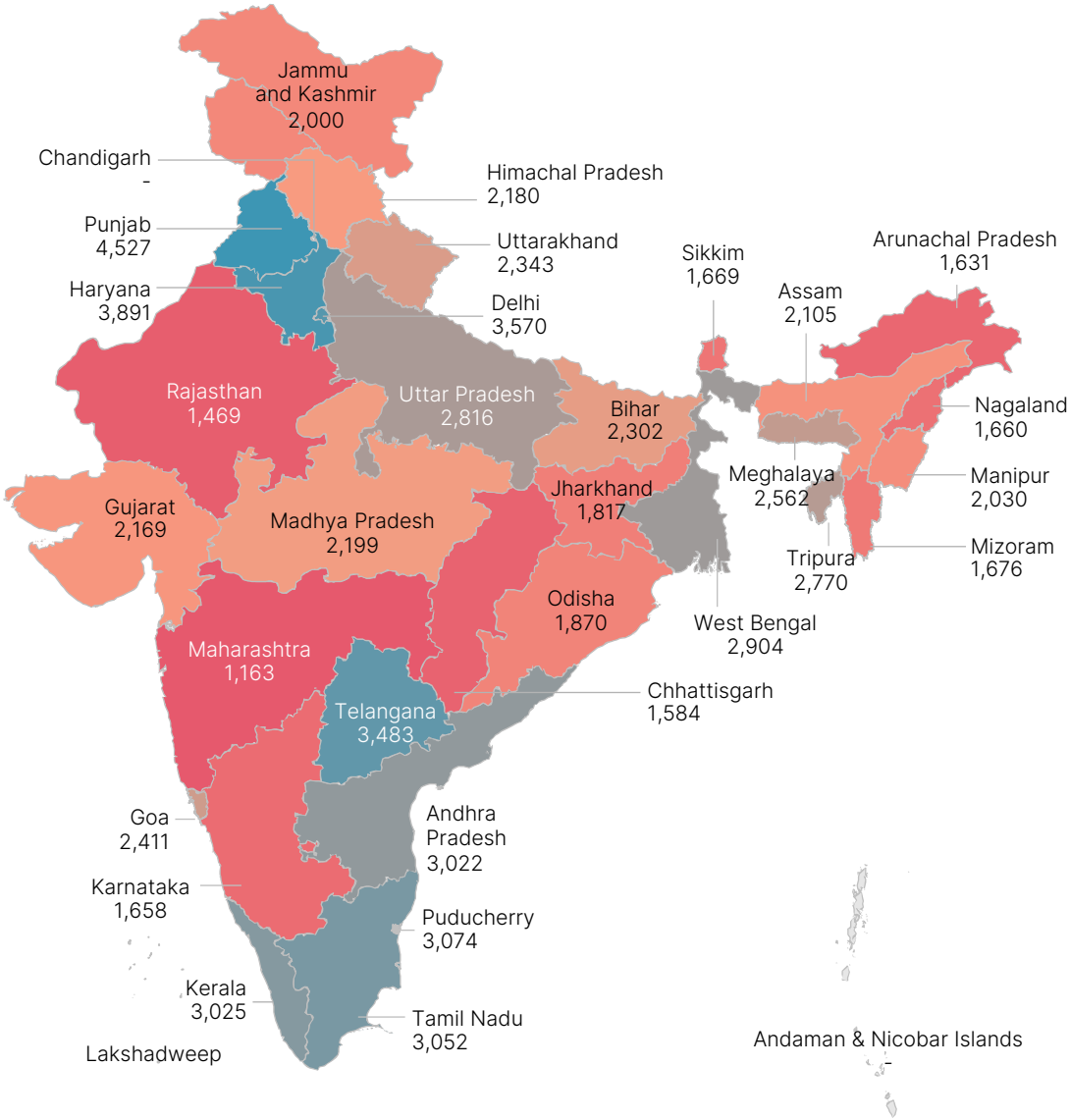


Source: Ministry of Agriculture and Farmers Welfare, Government of India; Ministry of Food Processing Industries, Government of India; National Horticulture Mission, Government of India

Yield of food grains (kg/hectare)

Punjab, Haryana, Andhra Pradesh, Telangana, Tamil Nadu, and Kerala dominate in terms of food grain productivity

Still, many states fall behind in productivity even with favourable agriculture conditions, such as Uttar Pradesh, Bihar, Odisha, and Assam



How India Inc. could help

Five key immediate steps could be taken to support the agriculture sector: strengthening market linkages to promote food processing and exports; adopting technology for exports; using technology for farming; enhancing infrastructure for greater productivity; and increasing farmer awareness. Producers could also focus on high-growth sub-sectors such as fruits and vegetables (mangoes, bananas, potatoes, and onions), livestock (milk, beef, and eggs), condiments and spices (areca nut, chilies, ginger, and garlic), and fishing and aquaculture. The following could be considered:

- **Establish end-to-end value-chain clusters:** Agriculture role players —including producers, agribusinesses, food processing companies, financiers, and corporates — could partner with central or state governments to create end-to-end crop value-chain clusters or food parks, particularly in states with high primary food processing (for example, Maharashtra for oilseeds and livestock; Andhra Pradesh for shrimps; and Tamil Nadu for potatoes and onions). The government entities could support farmers on input and crop selection, provide credit, tackle critical infrastructure gaps (for example, cold-chain logistics at shrimp farms), catapult value-add activities (for example, mango processing), and strengthen market linkages. An example of this in action is a leading consumer-goods company that has forged a private-public partnership with the Andhra Pradesh horticulture department to set up a chilli value chain for enhanced productivity, quality, and sustainability.
- **Set up commodity-specific digital export platforms:** Product-specific consortiums or forums could partner with the government to create commodity-specific digital platforms (for example, for shrimp, mango, beef, and milk products), and increase awareness on existing platforms (for example, on the Agri Xchange trade portal) to connect directly with international buyers. The platforms can help ensure compliance with export requirements through better traceability via GPS-enabled tracking systems, awareness about sanitary and phytosanitary standards of importing markets, and investment in research and development and treatment. India's Spices Board, for example, launched a 3-D virtual platform to connect India's spice exporters with buyers around the world[95].
- **Improve pre-processing and cold-storage infrastructure:** Agri-logistics companies could create pre-processing centres — for example, ripening chambers for mangoes and osmotic dehydration centres for pineapples — that are near farms and do not need a large capital outlay. They could also shift from single-product to multi-purpose cold-storage facilities to reduce the risk of wastage due to low demand in the market and to improve utilisation, invest in alternate energy technologies such as solar-powered systems, explore chemical treatments to extend the shelf life of produce, and create integrated pack houses. These changes could be first made in states that lack cold-chain capacity, such as Maharashtra, Madhya Pradesh, Karnataka, Andhra Pradesh, Tamil Nadu, and Rajasthan.
- **Use technology to improve outcomes:** Agriculture technology start-ups could focus on developing deep-technology, AI-powered subscription products and services (for example, scientific warehousing) that build on Internet of Things (IoT) remote sensors and compiled digitised data (farm, weather, soil, warehouses, cold storage) to customise the right solutions at the right time.[96] The Sohan Lal Commodity Management group, for example, has patented a platform that can reduce post-harvest losses from 10 percent to 0.5 percent, while India's agriculture ministry has a memorandum of understanding with five companies — Cisco, Ninjacart, Jio Platforms, ITC Limited, and NeML — to develop pilot projects using AI and blockchain to modernise farms[97].
- **Education and training for farmers:** Companies in the agriculture value chain (food processors, banks, agriculture start-ups, logistics firms, and agriculture input providers) could collaborate with the Indian Council of Agricultural Research and government agricultural bodies to introduce an agriculture curriculum in schools.[98] They could also create partnerships to provide farmers with training and information on inputs, climate or weather, crop demand, technology use, supportive government schemes, and best practices. A working example of this is the partnership between Sahyadri Farms and Tata to set up skills development centres.[99]

In addition to the above, it is important to promote research and development (R&D) in agriculture and incentivise sustainable practices over the next three to seven years. Sector stakeholders can partner with agriculture research and development institutions and government bodies to provide incentives and promote research. For example, the agrichemical company UPL partnered with GB Pant University of Agriculture to promote sustainable agriculture research.[100] Research areas could include developing climate-resilient and water-efficient crop varieties, creating microbial or organic solutions for crop protection, and developing precision-farming technologies, including AI and IoT robots.

95 "Shri Piyush Goyal calls upon the spices industry to double the sector exports to USD 10 billion in the next five years, Ministry of Commerce and Industry," February 26, 2022.
96 Agri Stack can be leveraged to access more granular and comprehensive data to build solutions.
97 "MoUs for algorithms and data points for profit: 4 new MoUs signed between the Ministry of Agriculture and private corporations, including Jio and Cisco," Internet Freedom Foundation.
98 In June 2022, the Indian government announced the introduction of an agriculture curriculum to be led by the Indian Council of Agricultural Research. One of the objectives of the curriculum initiative is to ensure that vocational training forms part of the National Education Policy 2020..
99 Impacting change advancing society, Tata Trusts Annual Report, 2019-20.
100 BL BENGALURU BUREAU, "UPL partners with GB Pant University to promote sustainable agriculture," The Hindu Business Line, June 13, 2022.

Ideas policymakers could consider to support India Inc.

Promote the creation of Farmer Producer Organizations (FPOs) by eliminating different treatment between different types of FPOs (for example, producer company versus co-operative) and giving them agri-start-up or MSME status to accelerate benefits such as tax exemptions, easy access to credit guarantees, collateral-free loans, and favourable public-procurement norms. Policymakers could also set up a national board for FPOs like the MSME board to impart necessary skills, provide a network, monitor progress, and link each FPO with an agricultural university, institution, or network for ongoing technical support and guidance.

Central export agencies could boost trade by redesigning India's engagement with countries and buyers and offering attractive promotions to end-customers. They could harmonise domestic food-quality benchmarks with international standards to minimise rejections by importing nations and enter into government-to-government equivalence mutual-recognition agreements.

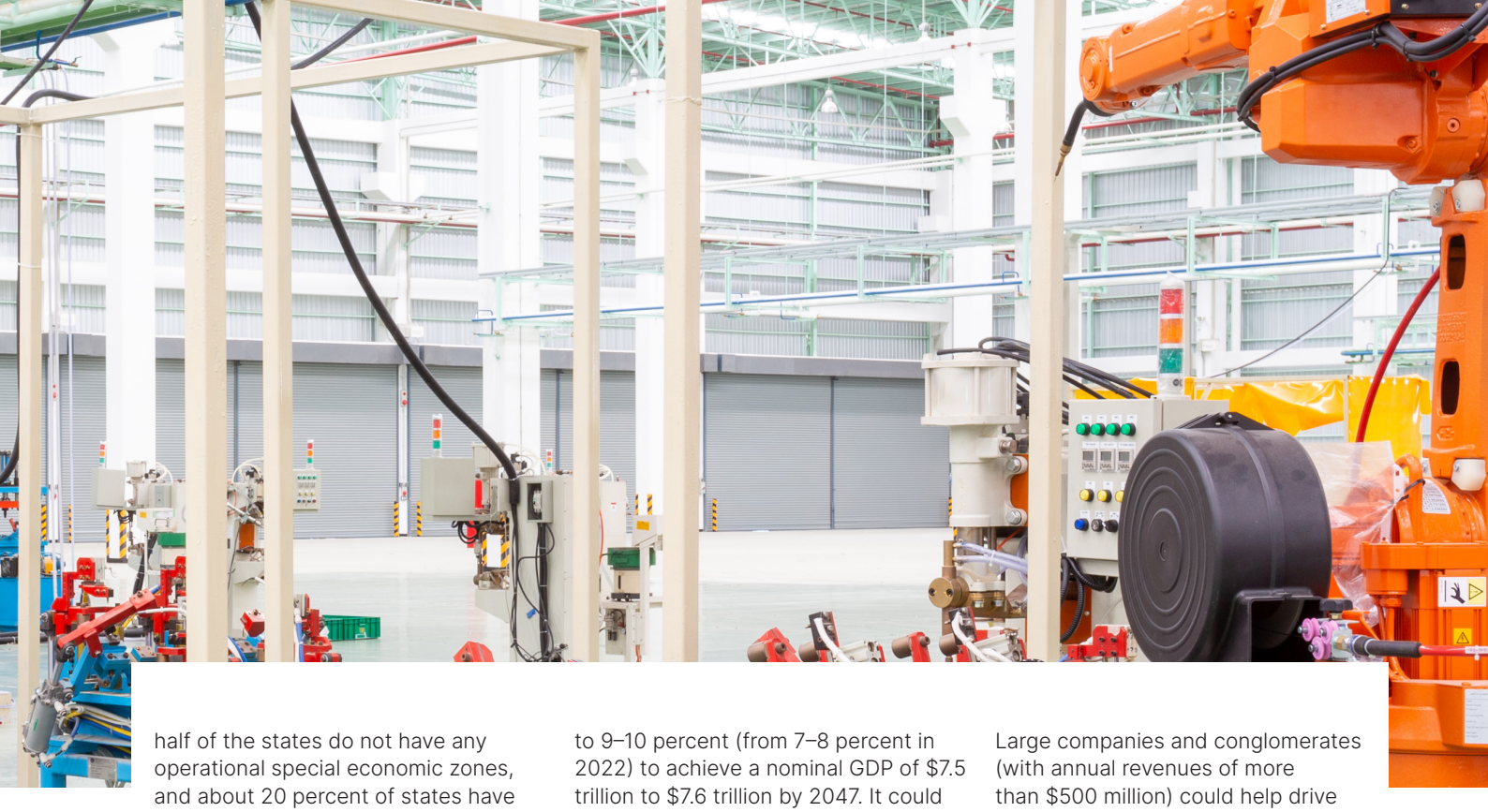
3.2 Manufacturing

Over the last decade, India has made significant progress in strengthening the competitiveness of its domestic manufacturing, especially under the Atmanirbhar Bharat and Make-In-India initiatives. Recent policy reforms have created a favourable environment in which manufacturing can grow. These include the introduction of the goods and services tax, the launch of the National Single Window System, and a steadily expanding production-linked incentive scheme, which is expected to drive growth of $500 billion in strategic sectors, such as electronics and capital goods, chemicals, textiles, auto and auto components (including electric vehicles), solar modules, batteries, and pharmaceutical and medical devices[101].

However, India still has some distance to cover to become a manufacturing powerhouse. Manufacturers in the country have been slow to transition to the use of advanced technologies and have limited expertise in advanced manufacturing, particularly in sectors such as electronics, semiconductors, and renewable-energy components. They are also burdened by a high cost of compliance: India requires 2,000 compliances, compared with 300 to 500 in comparable Asian economies.[102] Indian goods also have lower brand equity than those made by peer economies.

India's manufacturing landscape is diverse, with a huge disparity between its 28 states. For example, about 40 percent of total net value added is contributed by three states — Maharashtra (about 13 percent), Gujarat (about 12.7 percent), and Tamil Nadu (about 12 percent) — while about 60 percent of the states contribute only about 20 percent of overall net value added in manufacturing. Similarly, India has 268 operational special economic zones that are concentrated in about ten states, while around

[101] "Production linked incentive (PLI) scheme: For large scale mobile and component manufacturing," Press Information Bureau, Government of India, November 17, 2021.
[102] "Manufacturing companies may need up to 2,000 compliances under laws," The Times of India, January 29, 2020.



half of the states do not have any operational special economic zones, and about 20 percent of states have fewer than ten operational special economic zones (Exhibit 12).

As a result, India's manufacturing productivity lags behind its peers: Indonesia's output is twice that of India's, while China's and South Korea's are four times higher.[103] In the last decade, manufacturing's share of employment in India has increased by only 1 percent, compared with 5 percent for services.[104] Compounding this, the COVID-19 pandemic has exposed the fragility of critical supply chains and many companies across the world have started decentralising their sourcing and manufacturing to build in greater resilience and reliability.

Despite these challenges, India's manufacturing sector has significant growth opportunities, spurred by shifts in global trade flows, increased avenues for capital availability, the rising adoption of Fourth Industrial Revolution technologies (Industry 4.0), and a favourable policy environment. Overall, manufacturing has the highest potential of all sectors to propel job growth, with the potential to create 60 million to 70 million jobs by 2030.[105] India could also aspire to boost its real GDP growth rate for manufacturing to 9–10 percent (from 7–8 percent in 2022) to achieve a nominal GDP of $7.5 trillion to $7.6 trillion by 2047. It could also aim to triple manufacturing exports by 2030 to between $400 billion and $420 billion (from $120 billion to $140 billion in 2021),[106] promote import-localisation efforts towards Atmanirbhar Bharat by driving down manufacturing as a percentage of imports to 10–15 percent by 2030, from 25–30 percent in 2021, in strategic sectors (for example, electronics, capital goods, and petrochemical intermediates).[107] At the same time, India could aim to boost overall manufacturing productivity fivefold by 2030 (by tripling labour productivity and doubling capital productivity), achieve 70–80 percent digital adoption by MSMEs, and increase the number of World Economic Forum lighthouses tenfold to drive IoT and automation adoption and boost productivity.[108]

By meeting these goals in manufacturing, India could triple the number of large firms (those with $500 million in revenue) by 2030 (from 2021's baseline), while boosting emerging sectors such as aerospace and defence, low-carbon technologies, and semiconductors.[109]

Large companies and conglomerates (with annual revenues of more than $500 million) could help drive down manufacturing costs, while facilitating **import localisation in strategic sectors** by establishing supplier development programmes to enhance the productivity of MSME suppliers, such as supplier grants for breakthrough innovation. These large firms could also share technology licences and knowledge and offer mentorship opportunities and partnerships to manufacture value-added offerings linked to the core product. For example, electric vehicle companies could help their MSME suppliers develop informatics, safety systems, and battery management systems. Local design and manufacturing could be encouraged across sectors including in smart energy solutions (e.g. solar, hydrogen metering, energy storage, charging infrastructure, etc.). Manufacturers, especially in Electronics sector can also leverage the Global Capability Centres (GCCs) in India to engage with start-ups under Open Innovation to create local designs. Companies in select value chains — particularly in engineering, chemicals, and machine tools — could also help boost Indian manufacturing by adopting contract-manufacturing models to increase capacity use to more than 80 percent.

103 Rajat Dhawan and Suvojoy Sengupta, "A new growth formula for manufacturing in India," McKinsey Global Institute, October 30, 2020.
104 Ibid.
105 McKinsey analysis. Sectoral GDP growth rate was arrived at using external countries benchmarked during high growth periods. GDP rate used to forecast 2022 Manufacturing GDP to 2047. Job creation from ITP.
106 India's turning point, an economic agenda to spur growth and jobs, August 2020.
107 "A new growth formula for manufacturing in India," 2020.
108 CRISIL survey of MSMEs
109 India's turning point, an economic agenda to spur growth and jobs, August 2020.

Exhibit 12

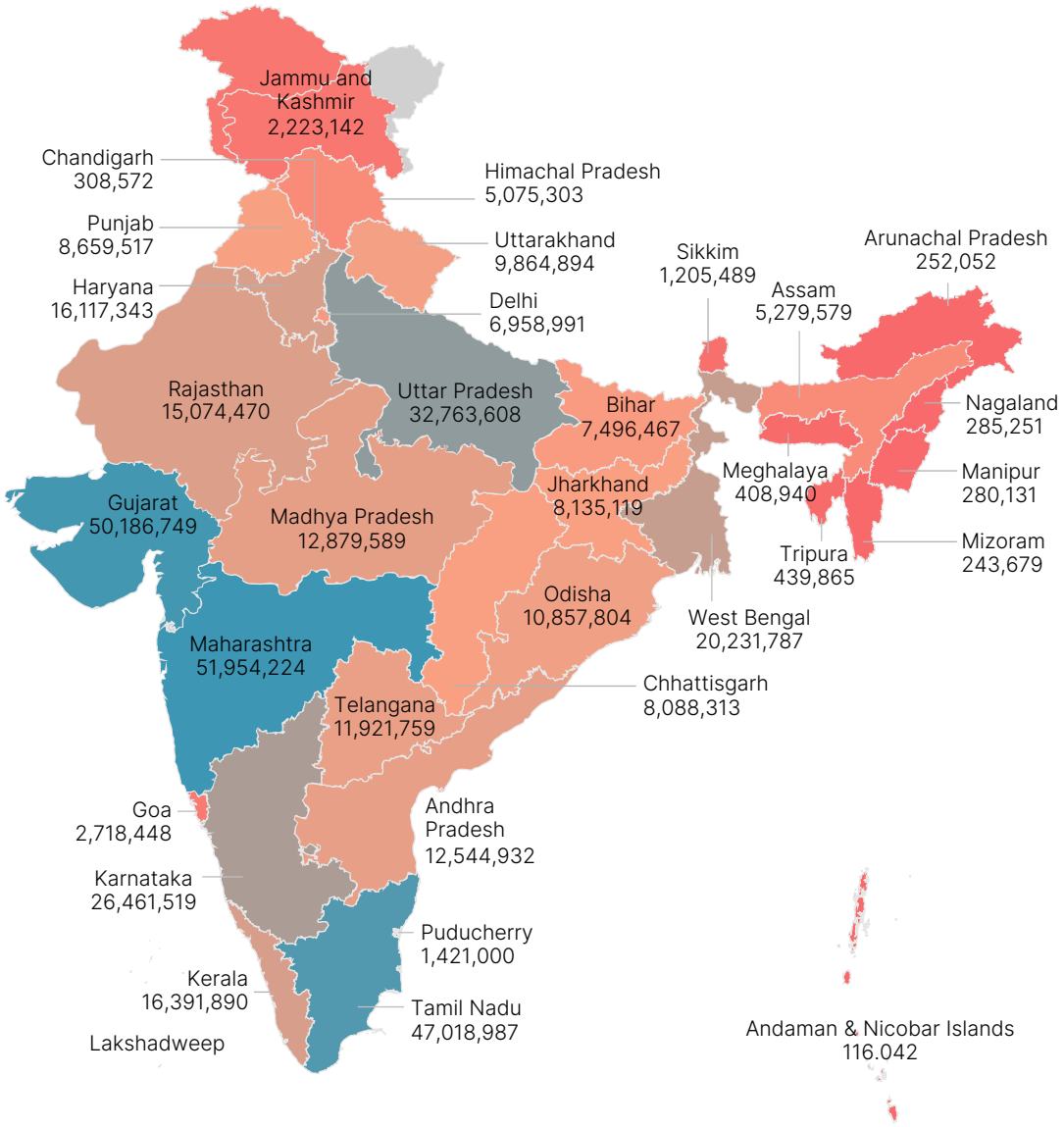
India's manufacturing sector has a wide disparity in net value added and concentration of special economic zones.

Manufacturing net value added by states (in Lakhs)

In manufacturing, ~40% of total net value added is contributed by three states – Maharashtra (~13%), Gujarat (~12.7%), and Tamil Nadu (~12%)

More than 60% of states such as Assam, Bihar, North-eastern states, etc, contribute nearly ~20% of overall net value added for manufacturing

116,042 — 51,954,224

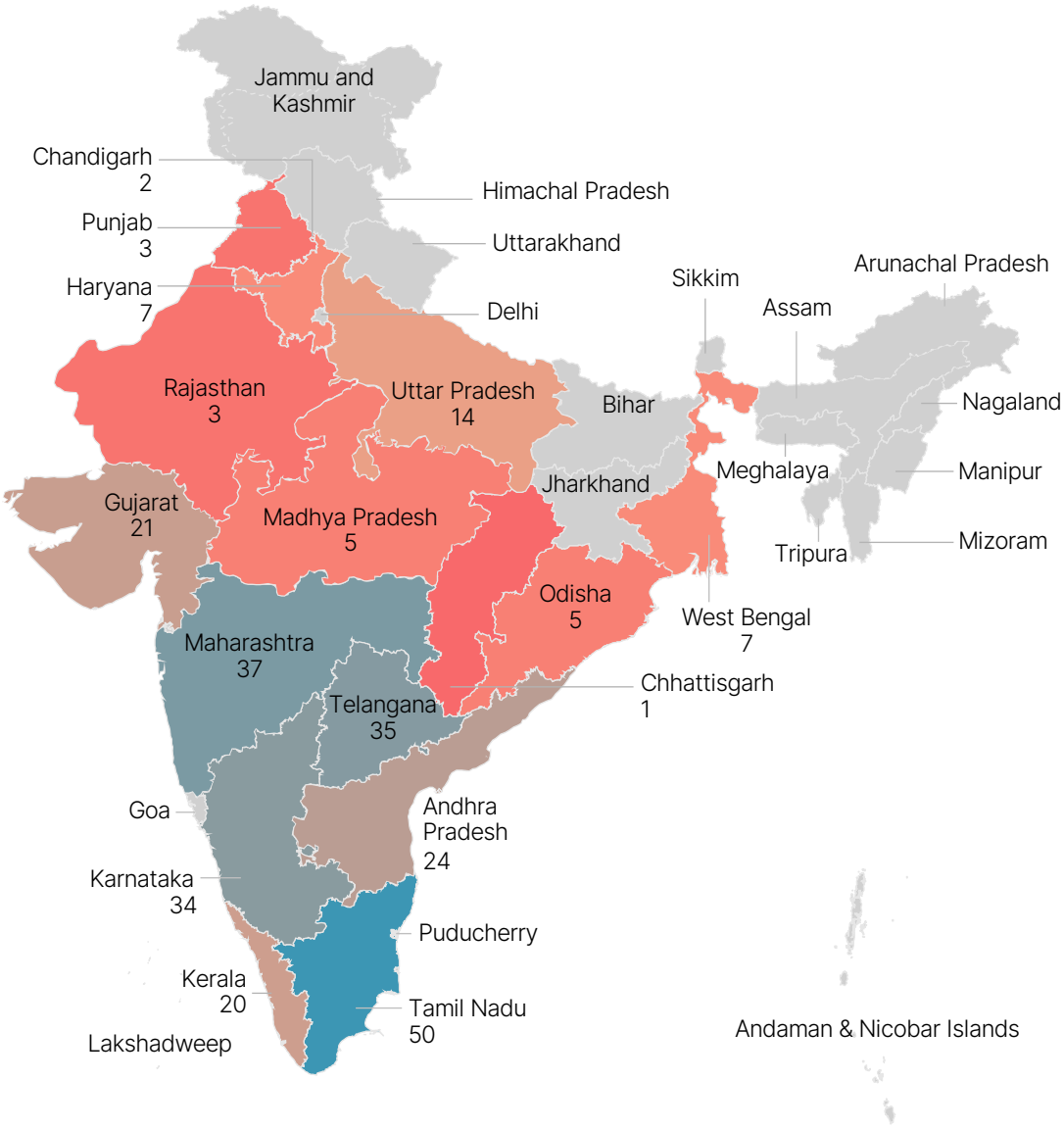


Source: Database by Ministry of Commerce and Industry; Department of Commerce; Government of India; Ministry of Statistics and Programme Implementation; National Statistical Office; Special Economic Zones in India

Manufacturing operational SEZ by states (#)

Almost 50% of states do not have any operational SEZ whereas ~20% of states have less than 10 operational SEZ in India

Four states with the highest operational SEZ are Tamil Nadu (50), Maharashtra (37), Telangana (35) and Karnataka (34)



How India Inc. could help

To support these efforts, industry bodies such as the Federation of Indian Chambers of Commerce and Industry (FICCI) could establish a national manufacturing technologies mission to identify technology gaps across sectors and facilitate the acquisition and transfer of key manufacturing technologies through international joint ventures and alliances. For example, industry bodies could facilitate joint ventures with specialised large auto players in South Korea and the US.

At-scale manufacturers (with annual revenues of more than $50 million) could also enhance local manufacturing and supply-chain set-ups with Industry 4.0 technologies by:

- **Partnering with domestic technology firms:** These partnerships could be aimed at incorporating IoT-based assembly-line and distribution productivity enhancements (such as digital twins, analytics-based process automation, chatbots, robot process-automation-based maintenance, and 3-D printing), which would enhance operational efficiency across key metrics, including yield, quality, and cycle time.
- **Digitising end-to-end value chains:** Digitisation could improve reliability and value-chain resilience. For example, by leveraging advanced analytics such as telemetry, manufacturers could optimise their delivery networks and better forecast demand at the stockkeeping and distributor level.
- **Developing employee capability-building programmes:** At-scale manufacturers could upskill or reskill their employees with the latest manufacturing technologies through tie-ups with academic institutions and digital training platforms.

Additionally, large companies and at-scale manufacturers could also support digitisation by increasing adoption of digital capabilities already launched by the government. The government's GeM portal, a one-stop online platform for public procurement projects, is just one example.[110]

Industry bodies could provide support for the above measures by promoting a "tech-enabled lighthouse culture" through industry forums, aligning a standardised framework for digital-maturity assessments, creating grants and awards programmes, and collaborating with the government to establish incentive programmes and a supportive policy framework. They could also help companies establish digital centres of excellence under the ambit of industry skill councils to upskill employees through online and offline modes.

Manufacturers in the sustainability industry, which includes solar modules and electric vehicles, could help India become a global green manufacturing capital by supplying green products and technologies, as well as low-carbon and sustainably produced goods across sectors. They could boost their global competitiveness by prioritising circularity by creating recycling hubs of excellence and leveraging shared infrastructure to reduce waste. They could also scale manufacturing set-ups by investing in high-volume giga-factories that adhere to international quality standards.

To complement these initiatives, manufacturers across the value chain could prioritise the creation of green alternatives, such as sustainable packaging, and green building materials, and industry bodies could help define a standard for "green" labels and establish a robust auditing process for green products.

[110] "Cabinet approves expanding the mandate of Government eMarketplace – Special Purpose Vehicle (GeM – SPV) to allow procurement by cooperatives as buyers," Cabinet, June 01, 2022.

Ideas policymakers could consider to support India Inc.

- **Establish free-trade zones and port-proximate clusters:** The central government could facilitate globally competitive manufacturing hubs in high-potential sectors, such as electronics and capital goods, chemicals, textiles, and apparel. For instance, the Mumbai-Thane-Raigad cluster could be shaped as a global manufacturing hub, particularly in electronics, chemicals, textiles, and pharmaceuticals. State governments could support efforts by creating plug-and-play cluster zones based on their manufacturing strengths. For example, multi-modal logistics parks are being set up in several cities under the government's road-development programme, Bharatmala, and these could become world-class efficient logistics zones for manufacturing (for example, electronics and aeronautics in Nagpur).[111] Solapur, meanwhile, could become a hub for textiles and apparel.
- **Expand production-linked incentive schemes:** The central government could offer investment-linked incentives for capital-intensive and sunrise sectors (particularly in sustainable technologies, such as advanced chemistry cell batteries, electric vehicles, and hydrogen fuel cells) to improve the efficacy of production-linked incentive schemes. It could also expand these schemes to include additional high-export potential sectors, such as white goods, electrical components, and contract development and research companies in the chemicals manufacturing industry.
- **Strengthen infrastructure:** State and central governments could strengthen infrastructure in key manufacturing hubs through public-private partnerships (PPPs) and special-purpose vehicles and expand smart-city coverage. They could also use new technologies to provide essential utilities, such as off-grid rural market electrification via solar infrastructure. Further, the sectors being considered for import localisation (including electronic components) could be incentivised by providing plug and play infrastructure.

Encourage development of electric vehicles: The Central and State governments could facilitate development of electric vehicle eco-system by enabling support for its market development, as well as supply chain and technology development. To ensure adequate access to capital, xEV retail finance could be included in the PSL, and credit guarantee pathways may be developed for xEV financing. Additionally, various subsidies and customer incentives being offered by different states could continue until significant penetration is achieved. Further, government funded common infrastructure/ facilities could be developed for prototyping, testing infrastructure, setting up of pilot plants, etc.

- **Simplify compliance requirements:** The central government could create a one-stop shop for clearances and industry queries through an e-governance platform to avoid delays and costs, and digitise the compliance process by, for example, implementing business reform action plans, and expanding the use of e-signatures.

[111] "35 multi-modal logistics parks to come up under Bharatmala project: Gadkari," The Economic Times, October 22, 2021.

3.3 Financial services

An increasing number of Indians have become banked, and the use of digital payments has risen exponentially over the last five to ten years.[112] Driven by Jan Dhan Yojana, a government initiative aimed at promoting financial inclusion, account penetration over the last decade has almost doubled, from 35 percent in 2011 to 78 percent in 2021.[113] During the six-year period between 2016 and 2022, the intensity of real-time-payments rose ten-fold — from fewer than five transactions per capita per annum to nearly 52 — driven by the expanding Unified Payments Interface ecosystem.[114]

Despite this growth, access to credit, particularly for MSMEs and retail customers, remains limited. India's retail credit is only 14 percent of GDP (compared to 30 percent in Brazil, and more than 60 percent in China).[115] Meanwhile, three-fifths of MSME credit in India is still sourced from the informal sector.[116] MSMEs seeking credit face an uphill battle due to the limited adoption of transaction-related data, such as bank statements and e-commerce platform transactions, which are needed for underwriting. There is also limited credit customisation for underlying needs and business cycles, and loan application processes are often lengthy. Also, lending costs in India are almost 5 percent higher than in peer economies, which further restricts credit growth.[117]

112 Asli Demirguc-Kunt and Leora Klapper, Measuring financial inclusion: The global findex database, World Bank, April 2012.
113 Ibid.
114 ACI Worldwide.
115 McKinsey analysis.
116 Report of the expert committee on Micro, Small and medium enterprises, RBI, June 2019.
117 India's turning point, an economic agenda to spur growth and jobs, August 2020.

There are additional challenges associated with the significant regional variation in lending requirements and formal credit activity. MSME activity is concentrated in five states (Maharashtra, Tamil Nadu, Uttar Pradesh, Gujarat, and Rajasthan), which together contain more than half of India's MSMEs. This points to a disproportionately high MSME credit requirement in these states (Exhibit 13). Further, most states fall below 50 percent credit, via scheduled commercial banks, to GDP, indicating low formal credit penetration and, consequently, higher reliance on informal credit.

India is well-positioned to transform credit access for MSMEs and retail customers, driven by several tailwinds. These include growing economic formalisation via mechanisms such as the Udyam Registration portal, which offers free online registration of MSMEs, and the Aadhaar-based e-KYC, a paperless authentication process of an individual's identity, carried out with his or her consent. The explosion in the availability of financial and non-financial data could also help to boost credit access, as would the rise of consent-driven data democratisation, via the Account Aggregator, which helps people access and share information digitally from one financial institution to another, and the Open Credit Enablement Network, which integrates and automates manual processes involved in the lending value-chain.

Growing partnerships between fintech players, Big Tech, and financial institutions will also support the transformation. The digital infrastructure of the Account Aggregator framework is already empowering people to shift away from physical collateral and instead leverage information-based collateral to enhance access to credit. The government has also introduced mechanisms to enhance MSME credit, in the form of the Credit Guarantee Fund Trust for Micro and Small Enterprises, which offers collateral-free loans, and other lending tools.[118]

India could strive to increase retail credit to at least 40 percent of GDP and formal-sector lending in MSMEs to at least 80 percent.[119] To achieve this, it would need to create an array of large lending banks and could aspire to have ten such Indian banks in the global top 50 (by market capitalisation) by 2047. It could also aim to achieve a 100 percent score on the Reserve Bank of India's (RBI's) Financial Inclusion Index (up from the current 56 percent) and rationalise lending costs to less than 1 percent of peer economies.[120] To fuel sustainable growth, India's banks could also aim to increase the share of green assets in their portfolios to 40 percent.[121]

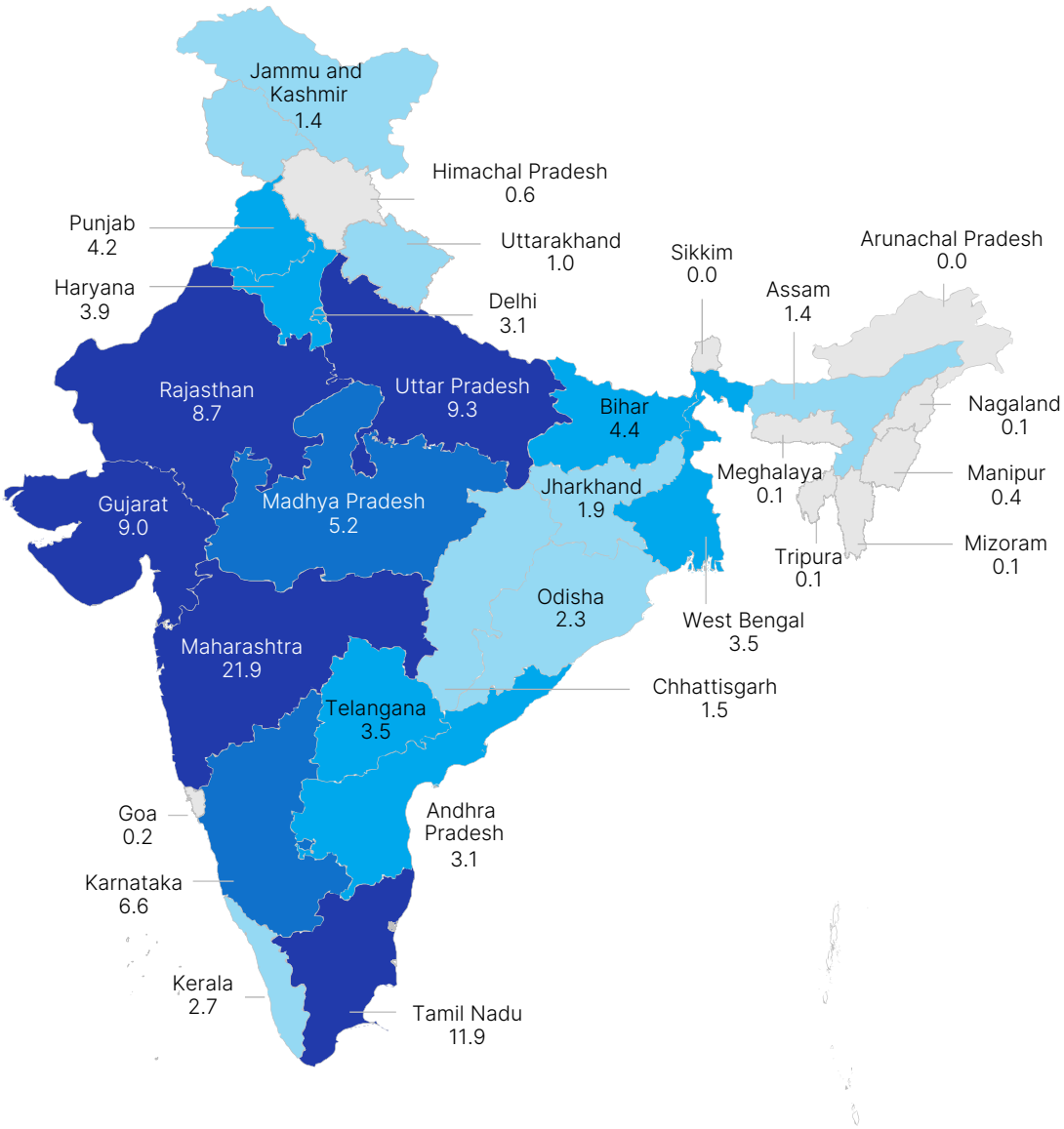
118 "Loans to MSMEs industries under CGS," Ministry of Micro, Small and Medium Enterprises, July 19, 2021.
119 McKinsey analysis. Aspirational targets based on the benchmark economies of Brazil and Vietnam.
120 McKinsey analysis – 100% signifies full inclusion.
121 Gopal K. Sarangi, Green energy finance in India: Challenges and solutions working paper, Asian Development Bank Institute (ADBI), number 863, August 2018, adb.org.

Exhibit 13

Significant disparity exists among states in terms of micro, small, and medium enterprises, and scheduled commercial banks.

Number of MSMEs (in Lakhs)

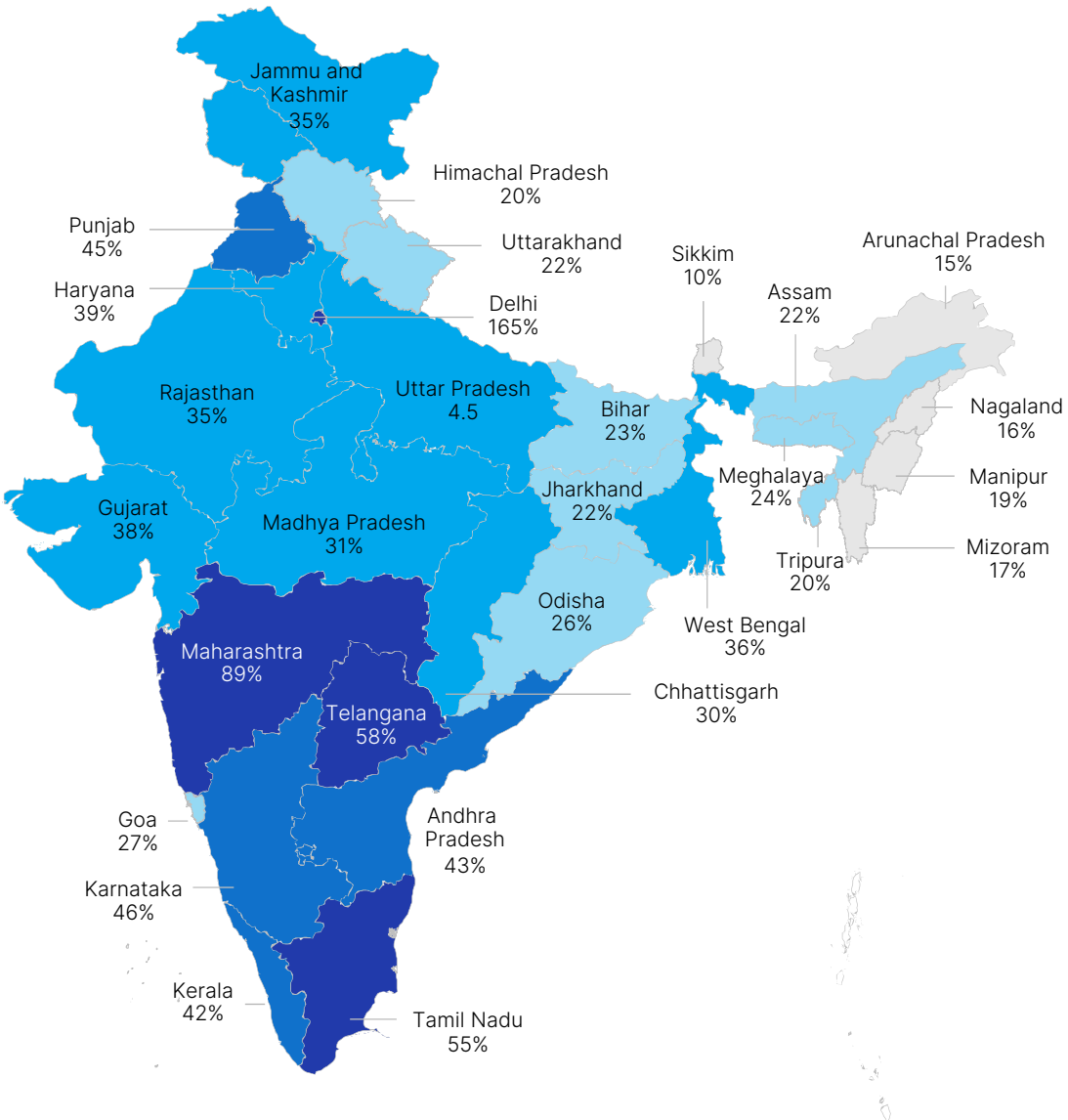
Top five states (Maharashtra, Tamil Nadu, Uttar Pradesh, Gujarat, Rajasthan) together account for ~55% of total MSMEs in India



1. State-wise Credit by Scheduled Commercial Banks in India

State-wise credit (by SCBs) to GDP ratio (FY20)

Only four states (Delhi, Maharashtra, Tamil Nadu, Telangana) have higher credit to GDP ratio than the national average(~50%)



How India Inc. could help

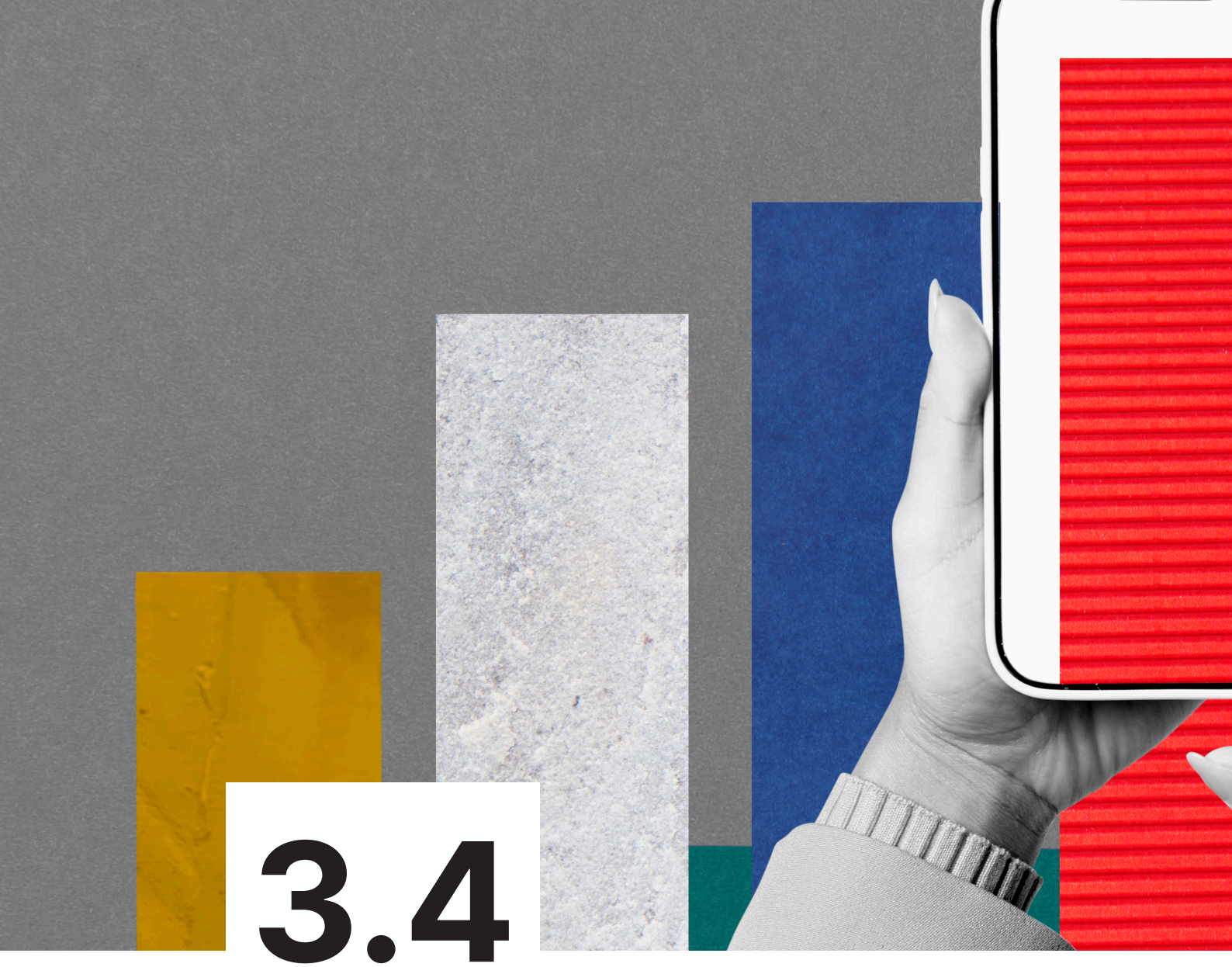
Stakeholders in the financial services sector, such as banks, non-banking financial companies, and fintech firms, could enhance the sector's efficiency and capabilities in the following ways:

- **Evolve credit bureaus:** Credit bureaus and the government's public credit registry could evolve into comprehensive, consent-driven information bureaus leveraging the Account Aggregator framework to enable stronger underwriting and monitoring. Such bureaus could capture and aggregate consumers' banking information to create early delinquency signals and provide (near) real-time data through integrations with industry participants such as banks and supply-chain companies. In doing so, they could create more dynamic and richer credit ratings and scores.
- **Launch a centralised awareness programme:** The banking sector (potentially under the Indian Banking Association) could establish a programme to create awareness around issues such as responsible lending practices, borrower and lender security against fraud, cybercrimes, credit scores, and lending risks. The programme could be structured and financed in a similar way to an initiative launched by the Securities and Exchange Board of *India, which* educates investors about mutual funds. Under this initiative, the board has mandated mutual funds to set aside two basis points of their net assets for investor awareness. A significant share of these funds is then directed to the Association of Mutual Funds in India, which runs media campaigns on the topic.
- **Build ecosystems around underserved segments:** Financial and public institutions could work together to build ecosystems around underserved segments to expand credit access. These ecosystems could be characterised by PPPs across financial services and sector-specific stakeholders to establish critical ecosystem infrastructure, policies to drive the mass adoption of critical use cases to enable at-scale digitisation of transaction flows and underlying assets, and certifying fintechs that can augment a lender's capabilities and help to customise and embed lending.
- **Promote co-lending:** Financial institutions could collaborate to standardise product-level nuances and commercial contracts, set up an industry-wide digital debt-platform using Application Programming Interface protocols, and simplify processes such as accounting and reconciliation.

In addition to the above, the industry could collaborate with regulatory bodies to ease access to collateral by **accelerating the creation of digital securities**. Securitisation of physical collateral, such as land and vehicles, would allow for digital verification and lien-marking. A significant step towards this would be to digitise land records under the Digital India Land Records Modernization Programme. Similarly, the Account Aggregator framework can be leveraged to accelerate the adoption of **information collateral,** such as invoices and securities, and increase credit penetration. Further, centralised blockchain-based, asset-specific utilities could be incubated to enhance digital security creation.

Ideas policymakers could consider to support India Inc.

- **Expand the Account Aggregator network**: The RBI could expand the Account Aggregator framework to include beyond-banking information such as provident funds, utilities data, warehouse receipts, and e-way bills, on the back of a consent-based process.
- **Sector-specific lending provisions:** MSME loan providers could create differentiated standards for economically weaker sections and non-performing assets based on sector-specific cash-flow patterns, such as crop cycles for agriculture traders, monsoon lows in construction, and seasonal variations in tourism. Loan terms could then be aligned with these considerations.
- **Drive digital Know Your Customer:** The government (via the Central Registry of Securitisation Asset Reconstruction and Security Interest) could make the current Central Know Your Customer (CKYC) process frictionless by expanding digitisation. It could also rationalise focus on proof-of-address and improve coverage to non-individuals. It could also accelerate CKYC registration of legacy accounts through targeted programmes.



3.4

IT, IT-enabled services, and software as a service

Over the last two decades, India's IT and IT-enabled services sector (ITES) has raised its share of exports and generated much-needed employment. It employs about 4.5 million professionals (a third of whom are women).[122] According to the National Association of Software and Service Companies (NASSCOM), revenue from India's IT industry grew by about 16 percent in 2022 to $196 billion.[123] The Indian software as a service (SaaS) industry generates $2 billion to $3 billion in annual revenue and has captured 1 percent of the global SaaS market.[124]

122 India's Tech Industry Talent: Demand supply analysis, NASSCOM, February 2022.
123 Includes IT services, BPM and ER&D.
124 Manav Garg, "Shaping India's SaaS landscape," SaasBOOMi, July 2021.

In the coming years, increased spending on enterprise technology is expected to fuel the growth of these industries in India and globally. Spending is expected to increase from the current level of 3 percent of revenue to 5 percent by 2030, driven by efforts to improve customer experiences and by the creation of omnichannel experiences, digital businesses, and cloud-native apps.[125] Increasingly, partnerships and ecosystems will determine the outcome of most deals in the sector, and the adoption of next-generation delivery models could drive dramatic improvements in productivity, quality, and time-to-market for IT, ITES, and SaaS players.

To take advantage of these tailwinds, Indian IT, ITES, and SaaS companies would need to win the intensifying global war for digital talent, tackle rising cybersecurity threats, scale up historically low investments in R&D, and prepare for global regulatory shifts (for example, growing visa restrictions).

India could aim to become a leader in cloud services, AI and machine learning, IoT, and cybersecurity. Overall, the country's IT and ITES industries could aspire to sustain an 8–10 percent growth rate (versus 3–4 percent globally) to reach $500 billion in revenue by 2030.[126] The SaaS industry could, meanwhile, increase its revenue to between $50 billion and $70 billion by 2030, capturing 4–6 percent of the global market and creating $1 trillion in market capitalisation.[127] It is imperative to achieve a 100 percent digitally skilled workforce in technology services, where every employee has at least one digital skill, by 2030.

125 Future of technology services – Winning in this decade, NASSCOM, February 2021.
126 Ibid.
127 "Shaping India's SaaS landscape," 2021.

How India Inc. could help

India Inc. could help to rapidly skill the talent pool, accelerate delivery modernisation and investment in productised offerings, and scale up SaaS in the following ways:

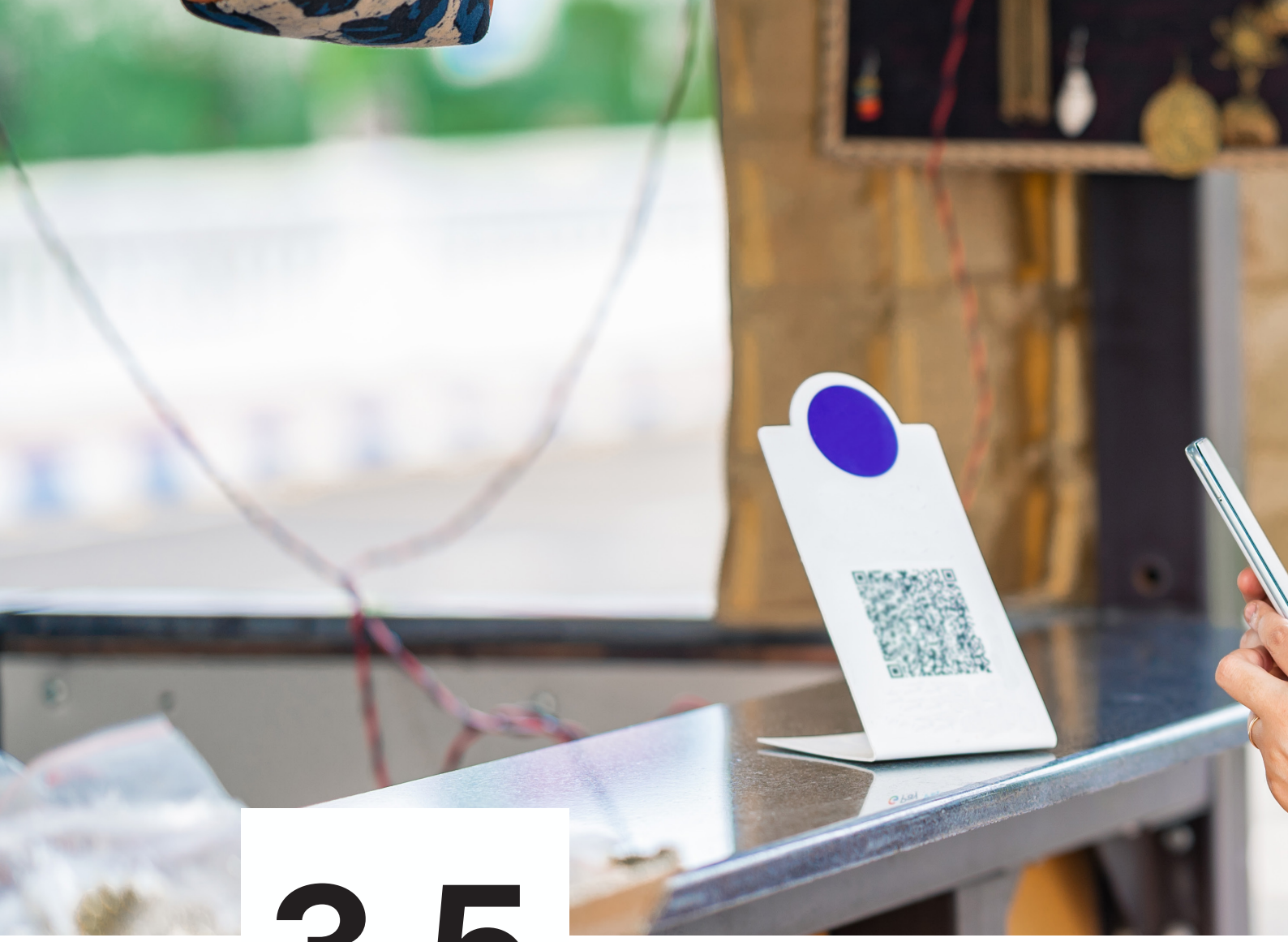
- **Modernise curriculum and learning methods:** Large IT firms, digital-native organisations, and SaaS companies could collaborate with state universities, the boards of higher secondary education, and other skills-development institutions to link curriculums to **industry-demanded skills via apprenticeships and through gamified or live projects and internship programmes.** For example, Indian-founded multinational IT company HCL has onboarded more than 7,000 school graduates via its TechBee programme, and the Freshworks Academy has trained 14,000 students in customer service. Adding tech skills to educational curriculums can help increase the tech pool from about 4 million in 2022 to about 9 million to 10 million in the next eight to nine years.[128]
- **Reskill and upskill the workforce:** IT, ITeS, and SaaS organisations could align on an industry-wide skilling and certification mandate to continuously qualify and upskill tech professionals in high-growth digital areas, such as AI, machine learning, and user interface. They could also collaborate to shape a standard curriculum with industry bodies such as the National Association of Software and Service Companies and SaaSBoomi (a community of founders, product leaders, and marketers nurturing SaaS firms) to ensure a 100 percent digitally skilled workforce by 2030. These skilling efforts could focus on high-growth digital areas such as Horizon 2 technology (including IoT, AI, machine learning, and 5G), Horizon 3 tech (including blockchain, virtual reality, and quantum computing), and SaaS-related skills (including product development and management, and product engineering).
- **Scale up SaaS players:** Industry leaders could help increase the number of large SaaS companies tenfold, to more than $100 million in revenue, by partnering with them to develop offerings, providing access to end customers in target segments, and helping build go-to-market and sales engines in international markets.[129] For instance, HCL Technologies has partnered with Innovaccer to jointly drive digital health transformation for healthcare and life-sciences organisations.[130]
- **Accelerate the adoption of emerging technologies and delivery models:** Software companies could accelerate the adoption of emerging delivery models and tools, such as AI-based code reviews, defect prediction, and software artisanship. They could also double or triple their investments in building "productised" offerings, assets, and platforms (in line with digital specialists). This could enable innovation for end clients, drive standardisation, improve quality, and reduce time-to-market.
- **Amplify India's role as a global innovation leader**: Technology-focused companies could collaborate with industry bodies and the central government to raise India's innovation profile by hosting conferences, industry meetings, and roadshows at a global scale. The consortiums could also seek the government's help to develop two or three domestic success stories across cloud, AI, IoT, and cybersecurity as World Economic Forum lighthouse projects.

In addition, businesses and operators could collaborate with central and state government bodies, academia, and investors to establish pan-India innovation clusters with enabling infrastructure, prototyping laboratories, start-up incubation funds, and talent-skilling programmes. These clusters could focus on **onshoring cutting-edge R&D and new product development** within industries of strategic importance to India to reduce import dependence, create jobs, and generate added value. This could include products and services such as advanced solar photovoltaic technologies, electric-vehicle ecosystems, and fertilisers. They could also **provide capital and mentorship to** start-ups, helping them improve the commercial readiness of scientific research through partnerships with academia and industry players to secure capital, infrastructure, and mentorship. The clusters could also **boost the use of India's** laboratory infrastructure across multiple sectors, connecting faculty and research institutions to industry players seeking to commercialise technology or test new products.

[128] India's tech industry talent: Demand-supply analysis, NASSCOM, February 2022.
[129] There is an opportunity for global leadership in areas aligned to India's strengths, such as horizontal infrastructure (including cybersecurity, DevOps, and dev tools) and vertical (e-commerce enablement, healthcare tech, logistics tech, and ESG tech).
[130] "HCL Technologies and Innovaccer partner to accelerate digital health transformation," HCL Technologies, October 19, 2021.

Ideas policymakers could consider to support India Inc.

- **Shape a favourable environment for research and development:** Grants, streamlined intellectual-property protection laws, and enabling infrastructure would help India become a research and development hub for leading product companies.
- **Expand domestic tech market:** The Ministry of Micro, Small, and Medium Enterprises and other central government bodies could help expand the domestic market for Indian SaaS start-ups by launching focused challenges to further develop the India stack, which aims to create a unified software platform to bring the country into the digital age. These challenges could be modelled on the 2019 ICT Grand Challenge to develop a smart water-supply measurement and monitoring system, or the government-sponsored 2020 Innovation Challenge for Development of a Video Conferencing Solution. The ministry could also launch awareness, skilling, and digital training programmes and incentive schemes for small and medium enterprises to adopt software solutions built by Indian SaaS companies for driving business digitisation.



3.5 Consumer technology

With more than 650 million internet users, India is one of the largest and fastest-growing markets for digital consumers.[131] Its share of the global consumption economy is likely to almost triple from 4 percent currently to 11 percent by 2047 as the consuming class grows rapidly and over 50 percent of households attain greater purchasing power of $11 per day.[132]

With smartphones in the hands of 80–85 percent of the population by 2030, India's connectivity is set to skyrocket. The country is expected to add 200 million internet users in the next four to five years.[133] This, coupled with ramped-up public digital infrastructure via the India stack initiative — including in agriculture and healthcare — and the emergence of new-age technologies such as AI, machine learning, and IoT, means that India is poised to become a digital powerhouse.

131 Bharat 2.0 Internet Study, Nielsen, (December 2021).
132 McKinsey analysis; World Data Lab.
133 Bharat 2.0 internet study, Nielsen, December 2021; Internet adoption in India, Kantar, June 2021.

However, the country would have to tackle challenges such as increasing cybersecurity threats, data privacy regulations, and the rising cost of hardware and software. The wide variation in internet subscriptions and mobile connectivity across states could also be a challenge. For example, states such as Delhi and Kerala have nearly twice the internet penetration of Orissa and Madhya Pradesh (Exhibit 14).

India could aim for fivefold growth in e-retail transactors (162 million in 2021 to 770 million by 2030), and to nearly double its share of the digital and organised market from around 30 percent in 2020 to 55 percent in 2030.[134] To help achieve this, it could strive to ensure 5G coverage for over 90 percent of Indians by 2030.[135]

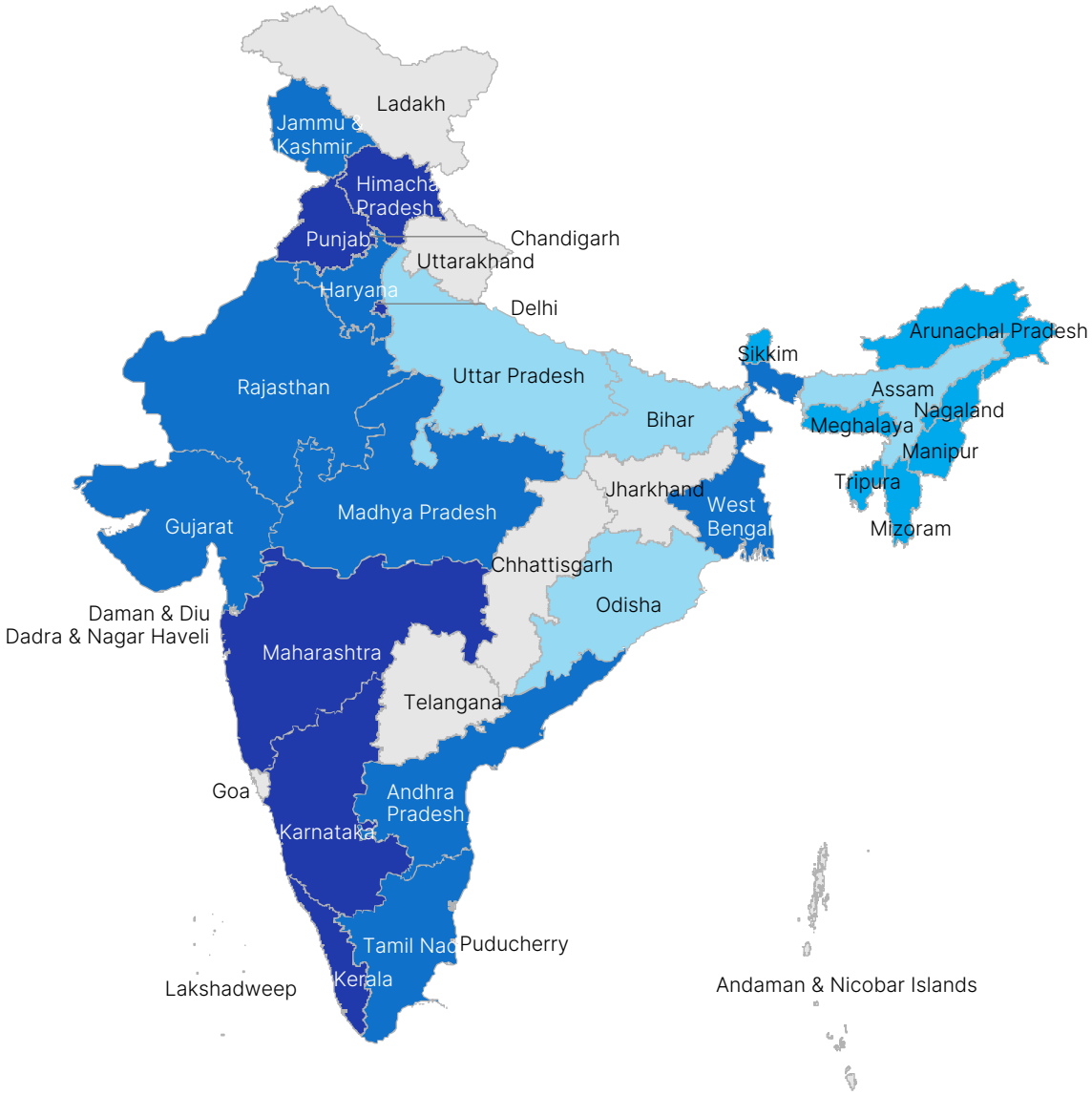
[134] McKinsey analysis. This includes consumer spending on F&G, electronics, lifestyle, pharma, other retail, healthcare, travel and mobility, leisure, and education. It excludes categories such as alcohol, tobacco, telecommunications, fuel, auto, and housing.

[135] 75–80% of the population to have mid-band 5G connectivity (less than 300mps). See Connected world: An evolution in connectivity beyond the 5G revolution, McKinsey Global Institute, February 2020.

Exhibit 14

State wise consumer tech analysis shows wide variety in internet penetration and mobile connectivity across various states.

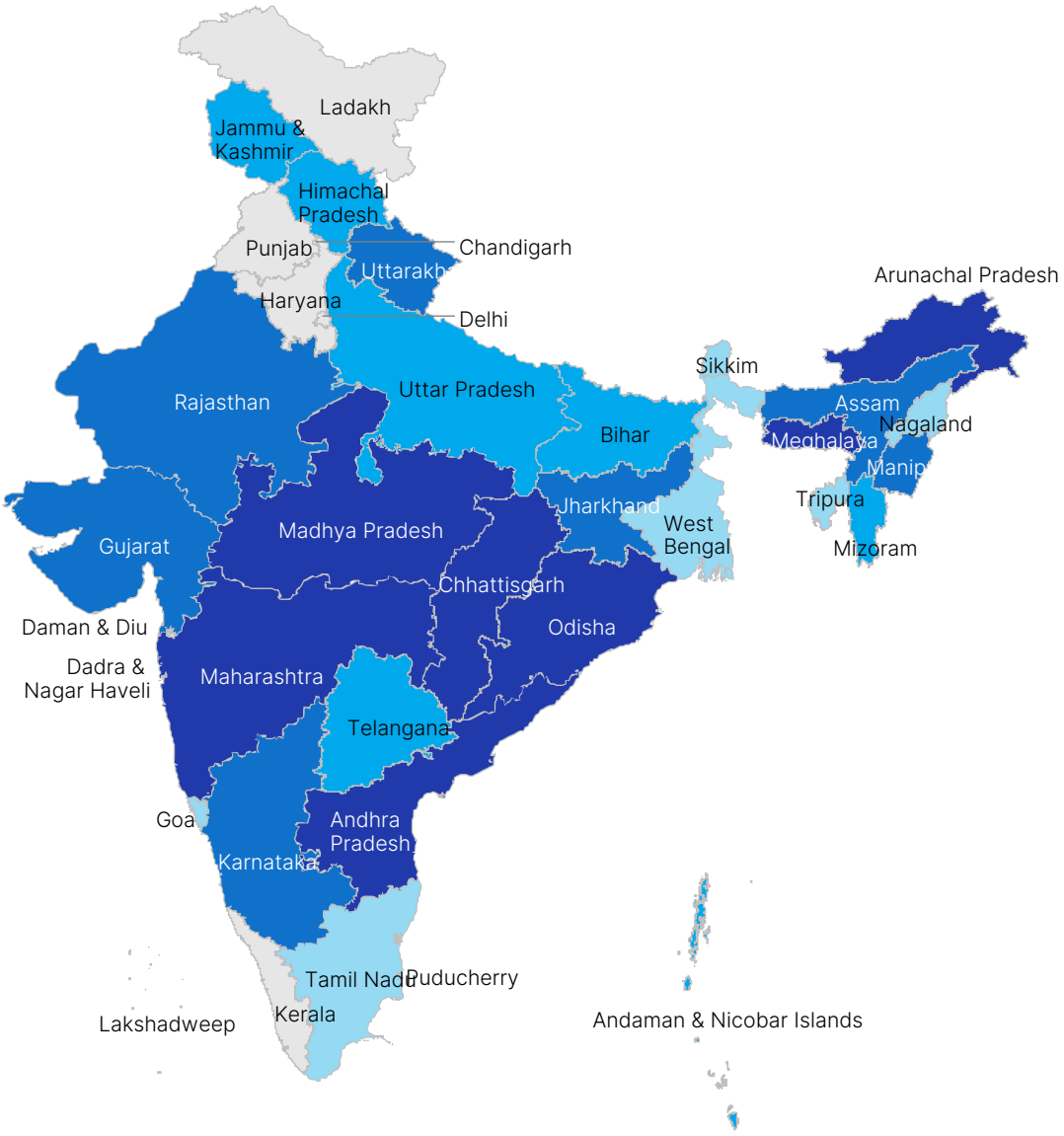
States such as Bihar, UP, Orissa, MP have lowest per capita internet subscription whereas states such as Delhi, Kerala and Maharashtra top the charts



Source: Ministry of Communications; Telecom Regulatory Authority of India (TRAI); Team analysis

Orissa has highest number of villages (6099) without mobile connectivity, followed by Arunachal Pradesh and Madhya Pradesh

Kerala, Punjab, Tamil Nadu, and Haryana are a few states with the highest penetration of mobile services in their villages



How India Inc. could help

To unlock this potential, businesses in India could develop new business models that help to optimise operations, harness public digital infrastructure and emerging technologies, and set industry standards on key technology (in collaboration with the government). Initial priorities could include the following:

- **Digital skilling:** Consumer technology companies could partner with industry bodies and universities to curate specialised training and certification programmes for creating a digitally skilled workforce. For example, Microsoft has collaborated with Quess, EY, GitHub, and FutureSkills Prime to launch Future Ready Talent, a virtual internship platform where students learn in-demand technology and tackle real-world challenges.[136]
- **Digitisation support to MSMEs:** Companies can offer solutions or advisory services for MSMEs to leverage digital opportunities such as e-commerce, digital design, and analytics. They can also collaborate with state governments or MSMEs to develop courses or training modules for small businesses on digitising business processes. The curriculum could cover demand forecasting, inventory planning, cataloguing, and other skills. An example of this is Amazon India's Kala Haat programme, in collaboration with the Uttar Pradesh government, which provides training, account management guidance, marketing tools, and a storage and delivery network to about 750,000 artisan households.[137]
- **Proactively shape industry standards:** Industry bodies, could work with the relevant government entity to develop and harmonise key industry standards and governance rules related to data management, classification, data privacy, "right to repair," and technologies such as cybersecurity, blockchain, and quantum computing. User feedback could be incorporated through public consultations in such programmes.
- **Identify data sets of national importance:** Industry players and start-ups could collaborate with central government under the National Programme on Artificial Intelligence to set up "data sets of national importance."[138] These could include data about healthcare, the grain value chain, land records, or weather. The necessary infrastructure could then be developed to enable industry to use the data sets — for example, by hosting open-source solutions, running AI models, or doing big-data analysis using computing infrastructure. Companies in certain domains, such as agritech, fintech, and e-commerce, could use the India stack and emerging technologies to innovate business models or create new solutions.
- For example, in commerce build solutions to enable small businesses to integrate with the Open Network for Digital Commerce (ONDC), use technology to personalise the customer experience via virtual storefronts, chat-bots, and other tools, and drive technology adoption by other value-chain players (for example, logistics and wholesalers) to increase market access, enable buyer-seller interoperability, and facilitate dynamic pricing. In Agriculture build "farm to fork" business models by leveraging farmers' data and using hardware and software solutions like geo-tagging and imaging, IoT sensors, distributed ledger, smart contracts, etc. to identify best-fit procurement areas, reduce logistics inefficiencies, and enable real-time monitoring of the value chain. In healthcare sector, India Inc. could partner with healthcare providers and the government to offer platforms, bots, and wearable devices to enable ubiquitous healthcare and personalise pre-emptive care through AI and machine-learning algorithms that use patient health records and the lifestyle data of millions from the "health stack" and electronic health records, to reduce overall costs.
- **Remote connectivity solutions:** Telecom companies could leverage unique Indian 5Gi standards (designed to facilitate 5G coverage for rural areas) to develop device connectivity solutions in collaboration with software players. The government could rigorously test for 5G adoption with, for instance, small-scale enterprises, to improve business outcomes.
- **Innovate for greater financial access:** Banking institutions, fintech companies, and software firms could collaborate with the National Payments Corporation of India for a full-scale commercial launch of UPI Lite (an on-device wallet system that could enable small offline transactions). This could serve populations in rural areas who struggle with limited internet connectivity. They could also co-develop a framework to enhance security and use distributed-ledger technology and emerging tech, such as the IoT, to bring innovation to existing systems.

[136] "Microsoft collaborates with AICTE, NASSCOM, EY, GitHub, and Quess Corp to empower India's youth with tech skills to be job-ready," Microsoft, September 15, 2021.
[137] "Avishek Rakshit, Amazon to work with artisan cooperatives, back sellers of traditional art," Business Standard, June 17, 2019.
[138] Unlocking Value from Data and AI: The India Opportunity, NASSCOM, August 2020.

Ideas policymakers could consider to support India Inc.

- **Accelerate new-technology testing by enabling regulatory sandboxes:** Central government bodies such as the Ministry of Electronics and Information Technology, RBI, SEBI, and the Telecom Regulatory Authority of India could ease the process of testing and piloting new technologies under government supervision. This would accelerate the application of new technologies such as blockchain, quantum computing, and 5G and 6G. It would also be important to encourage industry self-regulation for efficient consumer redressal and compliance.
- **Update foundational curriculum to enable tech literacy:** State governments could work with sector experts, companies, and industry bodies to implement the National Education Policy 2020, to supplement the school curriculum with digital literacy modules and strengthen learning outcomes through simulation and gamified projects on basic IT skills. This could include web development, basic coding, and data analytics. In parallel, they could help augment teacher capacity building through specialised educator certifications. For example, government of Sikkim has a memorandum of understanding with Microsoft to provide tech curriculum at schools.[139] Similar adult literacy courses could also be designed, with emphasis on the use of India Stack and Indian technology for services such as banking, healthcare, and agriculture.
- **Research grants:** The Department of Higher Education and the Ministry of Education could introduce key STEM modules into the top 50-100 Indian institutions and provide risk capital or non-term grants through bodies such as the National Research Foundation to build India's research and development ecosystem. Scholarships for postgraduates in hard skills such as physics, maths, and IT would help boost India's technological standing, and dedicated hiring programmes would create job opportunities.
- **Enable talent exchange:** The Ministry of External Affairs could consider international agreements with the Association of Southeast Asian Nations, Japan, Korea, and South American countries on a reciprocal basis for work visas instead of immigration visas for easier flow of talent and business.

[139] "Sikkim government signs MoUs with tech giant Microsoft to improve education sector," Times of India, February 2, 2019, timesofindia.indiatimes.com.

3.6

Healthcare

Since its launch in 2018, Pradhan Mantri Jan Arogya Yojana, or PM-JAY, has reported that it provides healthcare access and coverage to millions of low-income families in India. The scheme has linked up with more than 28,000 hospitals, enrolled more than 143 million Indians, and covered more than 35 million hospital admissions.[140] PM-JAY is complemented by the National Telemedicine Service, eSanjeevani, which is delivered by a network of 155,000 digitally equipped health and wellness centres. The service has provided outpatient e-consultation services to more than 35 million people.[141]

[140] National Health Authority, Ayushman Bharat Pradhan Mantri, Jan Arogya Yojana dashboard.
[141] Ministry of Health and Family Welfare, Government of India, esanjeevaniopd.in/About.

Despite this progress, India is far from providing universal high-quality health coverage, with almost half of the country's total healthcare expenditure currently out of pocket.[142] Adding to that pressure, more than 30 percent of India's population lacks health insurance coverage.[143] On the global Healthcare Access and Quality (HAQ) Index, India ranks 145th, behind many peer economies.[144] The country also faces a dual burden of undernutrition and obesity: almost 70 percent of India's population is protein deficient, most acutely in the states of Rajasthan, Punjab, Haryana, Himachal Pradesh, and Jammu and Kashmir.[145] About 53 percent of women aged 15 to 49 are anaemic, and about 35 percent of children under the age of five are affected by stunting.[146] India also faces the double burden of communicable and non-communicable and lifestyle diseases, and its disability-adjusted life years (DALYs) per 100,000 people currently stand at 33,000-35,000.[147] The DALY is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability, or early death.

India also faces a severe shortage of modern medicine doctors. With 13,08,009 modern medicine doctors registered with the national and state medical councils as of 2022,[148] there are about nine doctors per 10,000 people in India – well behind Organisation for Economic Co-operation and Development benchmarks. Across states, there are widespread disparities in doctor coverage – Punjab, Maharashtra, Tamil Nadu, Kerala, Goa, Karnataka, and Andhra Pradesh have 15 per 10,000 population, while almost all North Indian states fall significantly below the national average (Exhibit 15).

142 "National health estimates (2018-19) released," Ministry of Health and Family Welfare, September 12, 2022.
143 Health insurance for India's missing middle, NITI Aayog, October 2021.
144 "The global burden of disease study 2019," The Lancet, Volume 396, Number 10258, pp.1129-1306.
145 What India eats, ICMR, National Institute of Nutrition Report
146 Ibid.
147 IHME Global Burden of Disease, OECD Benchmarks.
148 "Government has taken multiple steps to further increase availability of doctors in country," Ministry of Health and Family Welfare, July 26, 2022.

Leveraging India's health stack and other infrastructure (including digitally enabled community health centres opened across the country under the Ayushman Bharat Digital Mission) would be instrumental in rapidly bridging this gap in coverage and helping underserved communities receive the care they need. This can be achieved by using telehealth-enabled diagnostics, and primary-care services delivered by digitally skilled healthcare workers in rural areas. India could also scale medical-training infrastructure in states with a severe shortage of healthcare professionals, by leveraging digital and revamped pedagogical methods, boosting capacity in medical colleges, and driving increased enrolments in medical degrees and specialist-training courses.

India has many advantages it could use to revolutionise healthcare at a country-wide level. It has long been a major global supplier of pharmaceuticals and a global powerhouse of digital technologies and talent. It also has a strong focus on sciences in school curriculums and many advanced healthcare facilities that already attract patients from around the world. In 2021, it allowed 74 percent foreign direct investment in private health insurance, up from 49 percent in previous years.[149] Leveraging these enablers could see India becoming the "hospital of the world", with universal healthcare for all Indians before 2021.

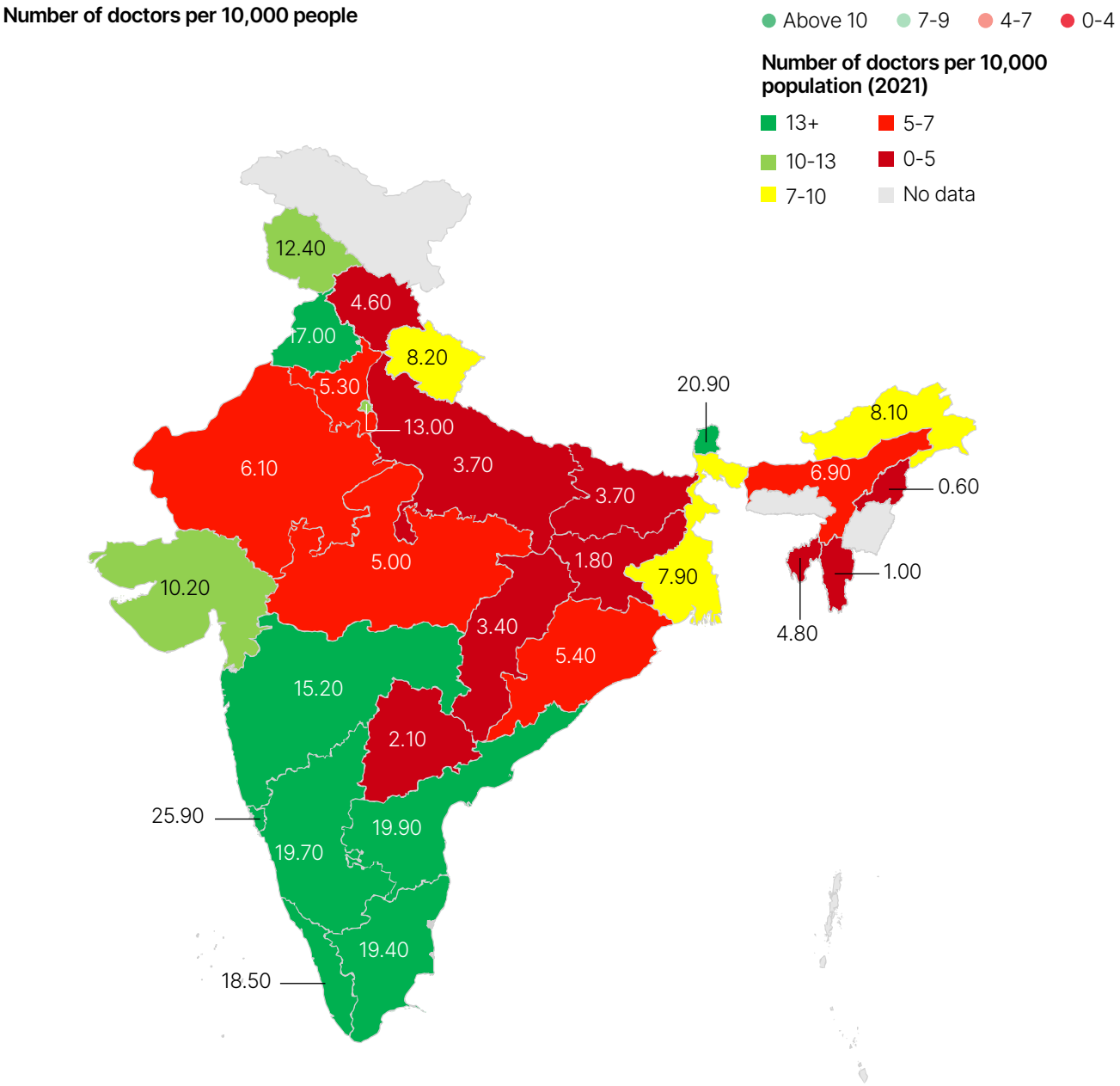
Specifically, India can aim to increase hospital beds per 10,000 people from 5–6 in 2022 to 40–45 in 2030.[150] It can also aim to bump up the number of doctors per 10,000 people from seven–eight in 2020 to 15–20 in 2030, and the share of the population with insurance coverage from about 70 percent in 2022 to at least 90 percent by 2030.[151] By building more state-of-the-art facilities, India can also attract more medical tourists, raising the total number from between 6 million and 8 million in 2022 to 30 million in 2047.[152] Overall, measures to make India's population healthier could drive DALYs down to 20,000–25,000 by 2030, and to 15,000–20,000 by 2047.[153]

Achieving these goals could require some aspirational actions going forward.

149 "FDI limit in Insurance sector increased from 49% to 74% and Foreign Ownership and control allowed with safeguards", Press Information Bureau, Government of India, Ministry of Finance, February 2021.
150 Human development report 2020 – The next frontier: Human development and the Anthropocene, United Nations Development Programme, December 15, 2020.
151 "Health insurance for India's missing middle, October 2021; Human Development Report 2020–The next frontier: Human development and the Anthropocene, United Nations Development Programme, December 2020; Aspirations basis benchmarking of best-in-class, OECD average.
152 India's turning point: An economic agenda to spur growth and jobs, 2020.
153 IHME Global Burden of Disease, OECD Benchmarks.

Exhibit 15

The number of doctors per l0,000 population varies significantly across North and South India



Source: National Medical Council (2021)

How India Inc. could help

- **Develop innovative treatments and advanced healthcare solutions:** Healthcare entities such as hospitals, research organisations, and start-ups could partner to develop next-generation digital technologies to build innovative treatments and advanced healthcare solutions. These could include therapies optimised for the Indian population, informed by genomic, metabolomic, and epigenomic data analysis. AI and machine learning could be used to enable robotics-based automation of routine diagnostics and surgical procedures, while also identifying new diagnostic methods.
- **Empower community healthcare workers:** Enhancing telemedicine platforms, point-of-care mobile testing solutions, and digital upskilling platforms could allow auxiliary nurse midwives, multipurpose health workers, and accredited social health activists to operate under remote supervision to deliver quality primary healthcare to underserved communities.
- **Improve underwriting efficiencies and reduce cost of insurance:** Private insurance companies could harness PM-JAY data, electronic medical records, and the national health stack to build actuarial databases that can enable high-efficiency risk-premium pricing, make claims processing and billing faster and more accurate, and reduce insurance costs.
- **Promote universal Fast Healthcare Interoperability Resources standards:** Private healthcare service providers and payors could form a council to drive the adoption of Fast Healthcare Interoperability Resources, like the Payment Card Industry Security Standards Council, with the objective of establishing, maintaining, and promoting universal standards.
- **Address India's nutrition gap:** India Inc. could drive a nationwide campaign in collaboration with the Ministry of Health and Family Welfare to dispel myths about nutrition (such as on protein consumption and spread awareness of alternate and cost-effective sources of protein (for example, soya milk and lentils), along with health benefits of the same. This could be supported by increased investments in product R&D for alternative proteins to achieve cost and taste parity with traditional protein sources, such as meat.

Ideas policymakers could consider to support India Inc.

- **Incentivise high-quality treatment and preventive healthcare:** The Ministry of Health and Family Welfare could use electronic health record analytics to augment the reimbursements system of PM-JAY and develop rating system for hospitals via an independent auditor, such as the National Accreditation Board for Hospitals and Healthcare Providers. The revised system could incentivise doctors to aim for early diagnoses, minimise procedural complications and misdiagnoses, deliver treatments at low costs, and encourage lifestyle improvements for patients. Additionally, associations could collaborate with Quality Council of India and work with NABH and NABL to promote accreditation across hospitals and labs in both public and private sector.
- **Accelerate the adoption of Fast Healthcare Interoperability Resources:** The Ministry of Health and Family Welfare, and the Ministry of Electronics and Information Technology could accelerate the enactment of a statute for healthcare data privacy and electronic health records interoperability standards for India. The ministries could also build robust digital patient consent governance systems and enforce compliance by all parties in India with access to sensitive patient health information. Clinical Decision Support System (CDSS) could be encouraged to assist healthcare providers in implementing evidence-based clinical guidelines at the point of care.
- **Increase private-sector participation in PM-JAY:** To boost insurance coverage across India, the Ministry of Health, and Family Welfare could enable greater participation of large and midsize private healthcare providers in PM-JAY. Two key measures that could drive private participation include expanding the use of diagnosis-related group pricing, which is a global system that categorises patients with similar clinical diagnoses. Although electronic health records data sets would be ideal for this purpose, it will take time to achieve scale. In the interim, existing data sets, such as normalised healthcare data sets from peer economies, could be used to categorise and price procedures. The other measure that could drive private participation is including primary and outpatient care in insurance coverage packages, instead of merely inpatient care.
- **Expand the variety of foods offered through the Public Distribution System:** This system, which sees government-sponsored shops entrusted with the work of distributing basic food and non-food commodities, could include protein-rich foods such as pulses to help provide balanced nutrition to rural families.
- **Expand the pool of medicine and surgery graduates:** The National Medical Council could boost the number of Bachelor of Medicine, Bachelor of Surgery (MBBS) graduates in India by allowing private hospitals to collaborate with medical colleges and enter an arrangement where pre and para clinical courses are conducted at the medical colleges whereas clinical courses are conducted at the hospitals.

3.7

Emerging energy

Renewable energy (RE) production is cheaper in India than in most countries in the world.[154] This includes the production of solar, onshore wind, hybrid, and, potentially, green hydrogen (hydrogen produced without fossil fuels). With strong policy support, definitive commitments to net zero greenhouse-gas emissions by 2070, and rapid investment growth, India's energy sector could support India's emergence as one of the world's most competitive green energy producers.

India would need affordable clean energy to meet a power demand of around 2,500 billing units (BU) by 2030 (double the current 1,300 BU).[155] India is endowed with vast renewable energy potential (Exhibit 16). Just four states in India (Rajasthan, Gujarat, Maharashtra, Jammu and Kashmir) together constitute more than half of RE potential in India (500 GW). These four states could reduce power procurement costs in the next decade, resulting in lower electricity prices. To ensure a just energy transition, India

[154] Nikit Abhyankar, "View: India's energy choices now will decide economic and environment future," The Economic Times, May 9, 2022.
[155] India 2030: Exploring the future, a joint report from CBRE and the Confederation of Real Estate Developer's Association of India (CREDAI), 2019.

can bolster energy security through domestic manufacturing and grid modernisation, as well as assimilate renewables for round-the-clock power supply.

To achieve this transition, India's energy sector would need to expedite renewable energy projects from 10 GW per annum to around 20–30 GW per annum.[156] Reliably integrating renewable energy into the grid, improving the power sector's financial health, and making focused efforts to innovate on new and emerging technologies could all support efforts to double RE generation from around 160 GW currently to 500 GW by 2030, and around 1,100 GW by 2047. Renewables could meet up to 67 percent of domestic electricity demand by 2047.[157] Increasing energy storage capacity (from 30 to 40 GW by 2030) to improve grid performance, meet peak loads, and ensure round-the-clock supply, together with an upgraded transmission grid to assimilate growing RE power, could augment these efforts.[158]

If these initiatives succeeded, by 2047, India could be the green hydrogen capital of the world, producing five million tons per annum by 2030 and 25 to 30 million tons per annum by 2047, and a global renewable energy hub that exports both energy and renewable energy equipment, with an annual manufacturing capacity of 50 GW by 2047.[159]

156 Sarita C. Singh, "India targets 85% of energy needs from green sources," The Economic Times, March 10, 2022.
157 ibid.
158 McKinsey India Decarbonization Model.
159 National Hydrogen Mission, 2030; McKinsey analysis; MNRE Vision 2047.

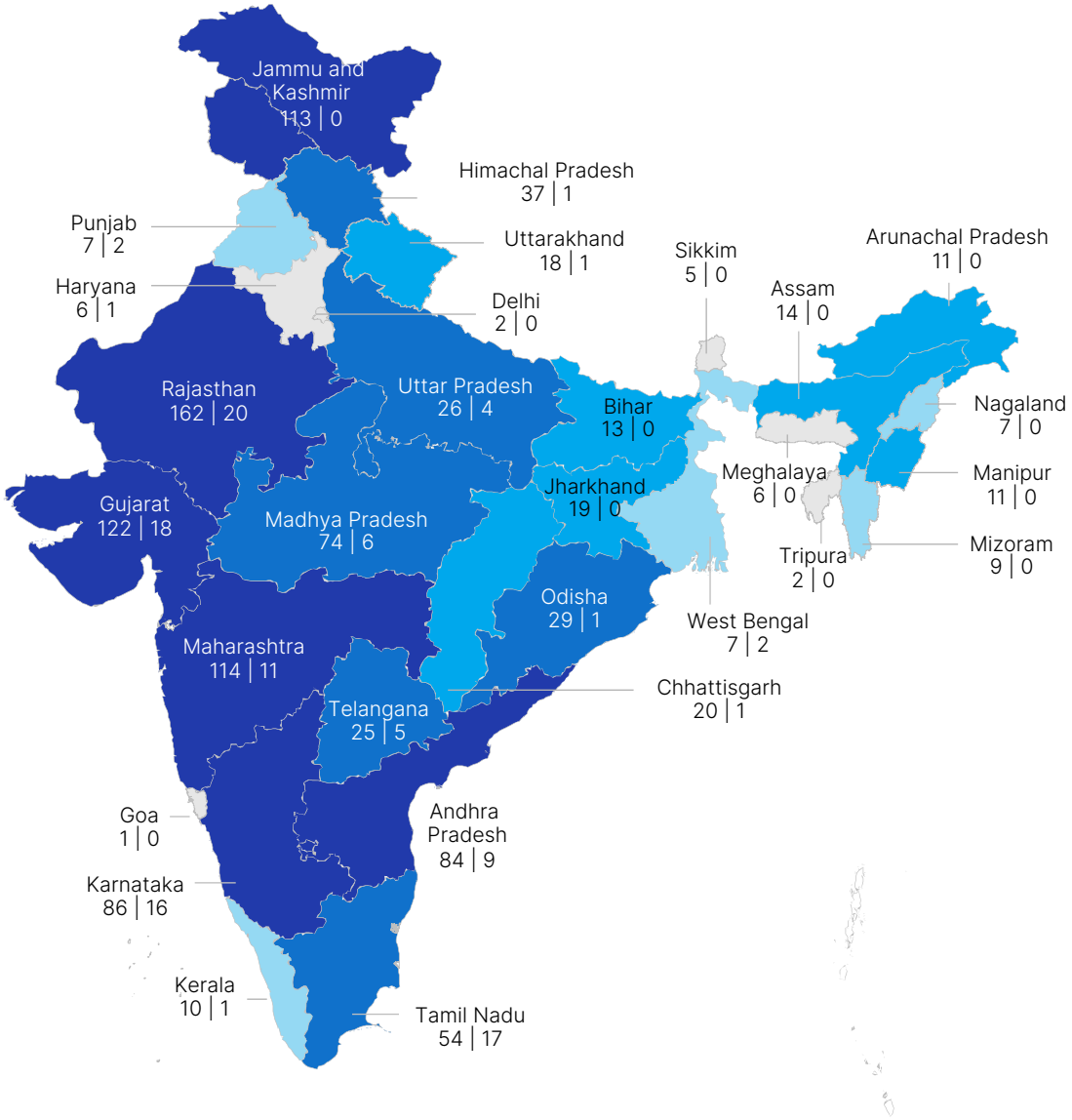
Exhibit 16

Many states have abundant renewable-energy potential, which can help them reduce their power purchase bill.

Renewable-energy potential

J&K, Rajasthan, Gujarat, Maharashtra, Andhra Pradesh, and Madhya Pradesh dominate in terms of renewable- energy potential

Total renewable energy potential in India is ~1,100 GW, of which only ~120 GW has been installed

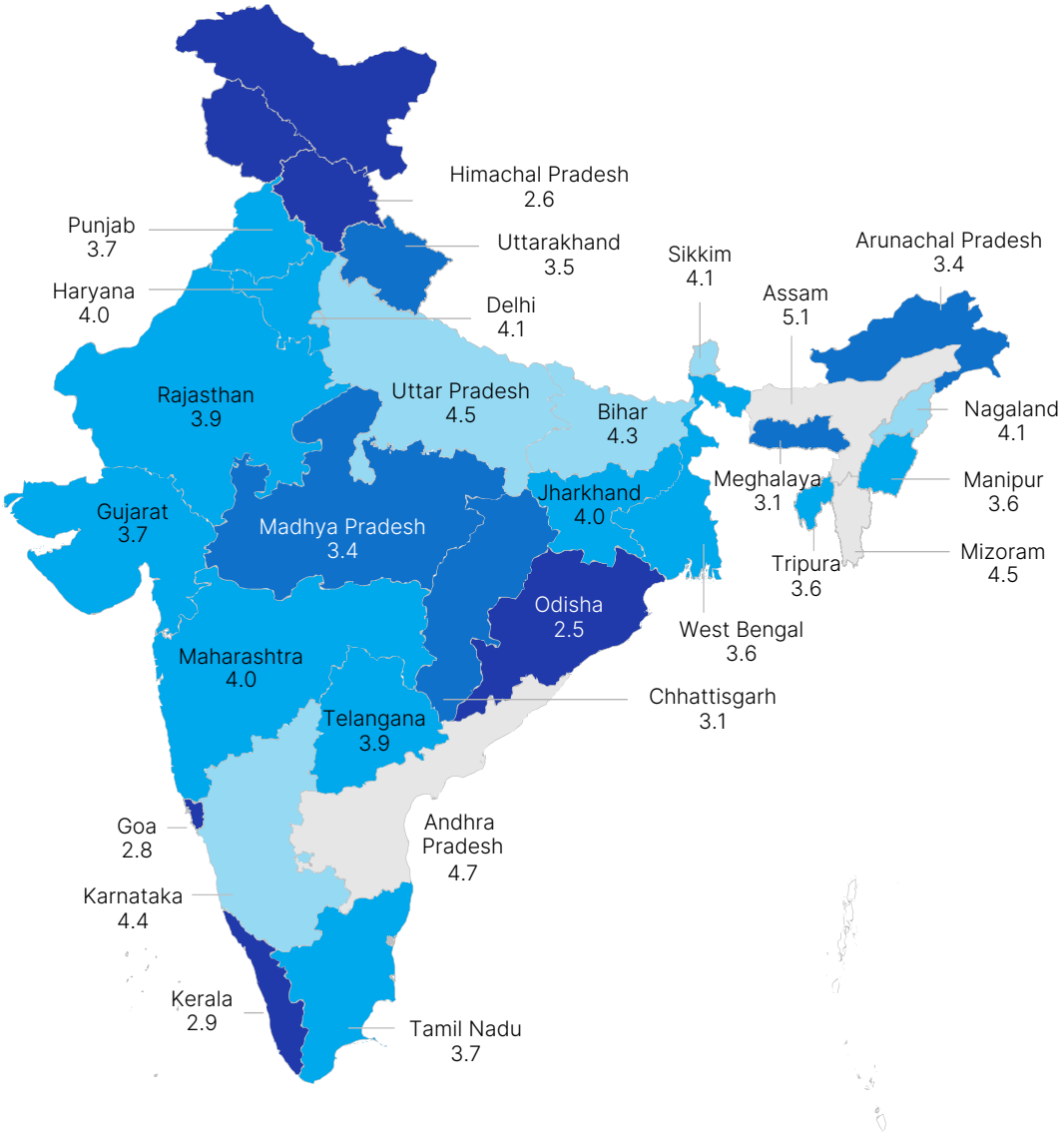


Source: Central Electrical Regulation Commission, Government of India; **Ministry of New and Renewable Energy, Government of India;**
1. Calculation of average power purchase cost [APPC] rate at the national level.

Power purchase cost of conventional power

States with abundant hydropower and in close proximity to coal are able to minimise their power procurement cost

Multiple states still have power procurement cost higher than INR 4/kWh



1. Excluding transmission charges.
2. Excluding renewable energy power, including hydro power.

How India Inc. could help

- **Deepen power markets:** Private players can come together, through industrial associations (as with the National Solar Energy Federation and India Hydrogen Alliance), to expand power derivatives and futures products. Further, energy organisations can leverage demand-side flexibility by adopting consumer time-of-day tariffs and electric-vehicle (EV) charging. They can also enhance supply-side flexibility by enabling existing coal and hydro plants to include renewable energy into power purchase agreements coupled with government support for open access, launching ancillary services and capacity markets, and building incentives for underutilised plants to participate in such markets.
- **Create green innovation clusters** comprising renewable energy companies, public agencies such as the Indian Renewable Energy Development Agency (IREDA) and the Solar Corporation of India (SECI), and others, academia, and innovation-focused start-ups for prototyping and scale-up of future energy technologies.[160] This could be made possible through a higher research and development spend, shared infrastructure, private equity and/or venture capital funds, dedicated approvals capability and government incentives.

In addition to the above, India could consider the following actions to fast-track its goal of becoming a global green hydrogen hub:

- Earmarking specific green energy hubs **(including RE and hydrogen clusters)** situated at ports and key industrial centres. This would capture large-scale industrial and export demand for hydrogen (via hydrogen special economic zones for export). Such clusters could include companies across the entire hydrogen value chain (production, storage, pipeline distribution, and refuelling) to optimise costs and kick-start large-scale adoption.
- Support from state regulators to **encourage hydrogen usage by setting up targets for partial and full adoption** and providing viability-gap funding (VGF) in some identified sectors, including, among others, industrial applications (green fertiliser, refining, and green steel), hydrogen mixing (in combined cycle gas turbines and city gas), hydrogen-based heavy-duty vehicles, and the use of hydrogen mixed with compressed natural gas (H-CNG).
- **Set up standards** for hydrogen electrolysers, fuel cells, and embedded products (such as green steel and fertilisers).

[160] Focus technologies could include non-lithium manganese cobalt chemistry, long-duration energy storage (LDES) and next-generation solar (such as perovskite, monocrystalline IBC, and monolithic cells HJT1), new renewable energy (including geothermal and tidal), hydrogen-derived direct reduced iron, fuel cell electric vehicles, hydrogen internal combustion engines, pure ammonia (for shipping), liquid hydrogen, synfuels, pumped hydrogen storage, and thorium-based nuclear.

Ideas policymakers could consider to support India Inc.

Extend the scope of existing bodies (such as IREDA) to operate as a central renewable energy planning and monitoring agency that will:

- Identify attractive land pockets (especially wasteland) for geospatial analysis and satellite imaging, and coordinate with power transmission companies to build injection points into the transmission grid.
- Create a data bank with details of solar and wind generation potential at particular sites. This could lower interest rates for project financing and promote insurance products to cover potential energy shortfalls.
- Coordinate with bodies, such as the National Land Monetisation Corporation, the Department of Land Resources and state governments, to either aggregate land in a solar-park model or facilitate acquisition by private producers.
- Reduce bottlenecks at a project level with monthly discussions chaired by the power minister.

Provide demand-side assurance for emerging technologies: Some actions could include developing an upcoming project pipeline for greater visibility, mandated uptake of renewable energy, and incentives to nurture the development of emerging technologies. The government could consider a mandate for nuclear power, as India has abundant thorium reserves and could take advantage of new technology, such as modular nuclear plants. Incentivising the first 5-10 GW of offshore wind (with support worth between $20 billion and $30 billion) could reduce solar requirements by between 20 and 30 percent (around 60-100 GW in 2030 and 400-500 GW by 2050) for a more balanced power mix and reduced risk of a shortfall.

Robust energy storage systems to meet peak demand and ensure round-the-clock (RTC) supply: Project implementing agencies and regulators can support energy storage infrastructure (battery energy storage systems, non-conventional, mechanical storage, and long-duration energy storage) with dedicated storage tenders, cost-reflective energy markets, initial FiTs, PLI schemes, and procurement mandates and incentives for use of stored energy.

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3.8

Water

India has taken many steps in the last few years to become more water efficient: from launching the Atal Bhujal Yojana scheme in 2019 to improve groundwater management, introducing various subsidies to promote micro-irrigation, and undertaking several successful public-private partnerships to strengthen water treatment, re-use, and distribution infrastructure.[161]

While these initiatives have been successful, many challenges around water access, availability, and quality remain. India continues to consume over 80 percent of its available surface and ground water resources each year, leading to an "extremely high" overall rating for water stress.[162] It harvests only 8 percent of rainwater, and treats only 33 percent of urban wastewater[163]. Consequently, up to 10 percent of Indians lack basic access to drinking water

[161] Exploring public-private partnerships in the irrigation and drainage sector in India: A scoping study, Asian Development Bank, July 2013, adb.org.
[162] "Aqueduct's water risk atlas," World Resources Institute.
[163] Joint monitoring drinking water coverage for 2020 by the World Health Organization and UNICEF, washdata.org; Composite water resources management index, a joint report from NITI Aayog and the Ministry of Jal Shakti and Ministry of Rural Development, August 2019.

within or near their homes.[164] If India continues to consume water supplies without replenishing its sources, water demand may outstrip its total supply by 2030.[165] By 2050, water shortages could cause GDP to shrink by 6 percent.[166]

Between 80 and 90 percent of India's overall water is used for agricultural purposes.[167] Of this, rice, sugarcane, and cotton contribute about 60 percent of total irrigation demand, while only taking up 30 percent of gross cropped area.[168] Water-intensive irrigation practices for rice account for 38 percent of total water required for agriculture in India. However, water productivity for both rice and sugarcane varies across states due to differences in climate, topology, rainfall, and agricultural practices. Shifting acreages of these crops away from states with high or extreme water stress to states with relatively low water stress could significantly enhance the sustainability of India's agriculture in the long term (Exhibit 17).

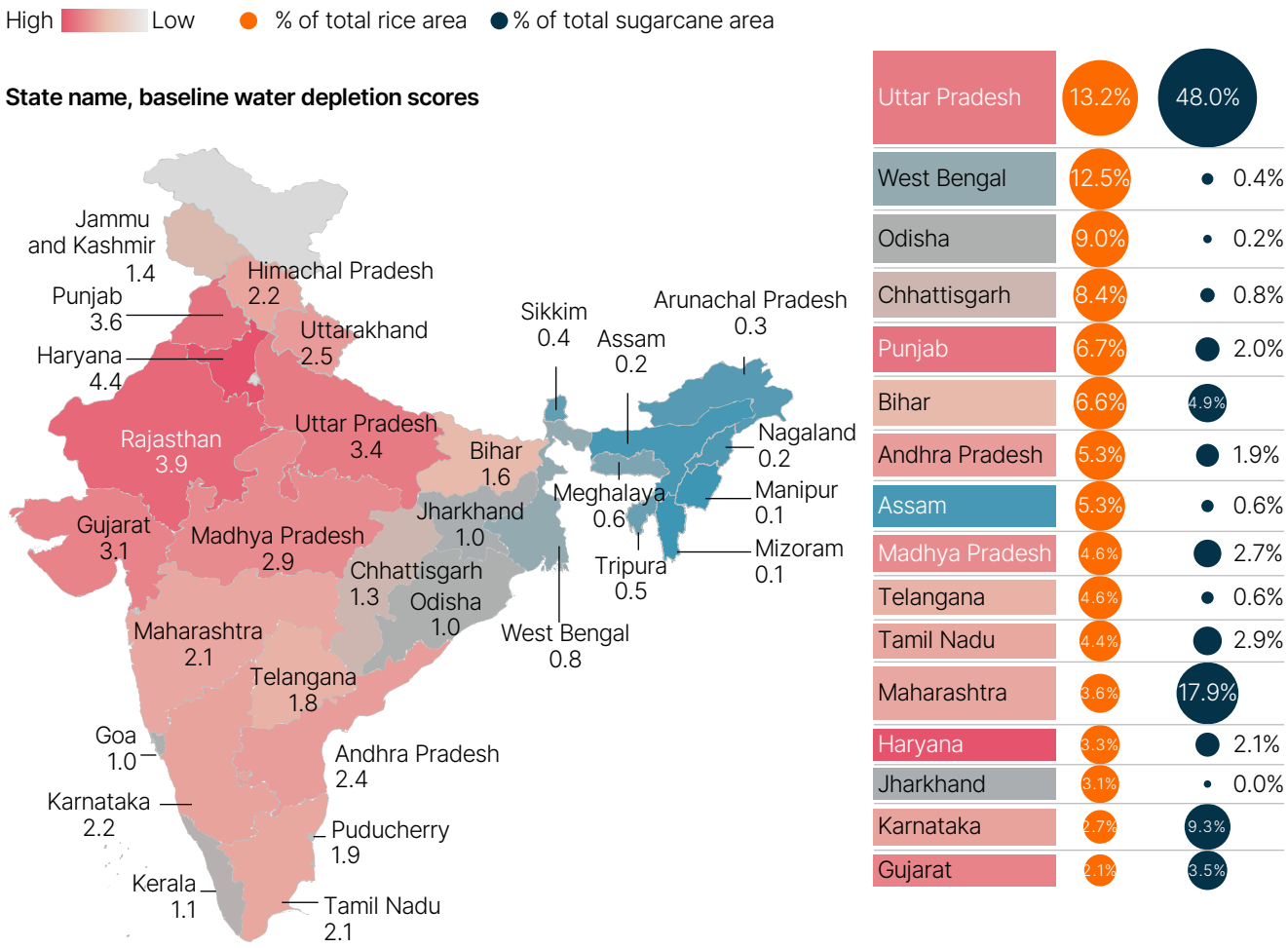
Uttar Pradesh, Punjab, Andhra Pradesh, Haryana and Madhya Pradesh, and Maharashtra are among top 12 Indian states for rice and sugarcane cultivation. They collectively account for 40 percent of rice cultivation, and 75 percent of sugarcane cultivation.[169] These states are also among the top 12 Indian states for water depletion owing to their dependence on groundwater reserves.

164 Joint monitoring drinking water coverage for 2020 by the World Health Organization and UNICEF, washdata.org.
165 Composite water resources management index, 2019; CWC Jalansh newsletter, June 2019.
166 "Climate-driven water security scarcity could hit economic growth by up to 6 percent in some regions, says World Bank," The World Bank, May 3, 2016, worldbank.org.
167 Sandip Sen, "If 80% water consumption in India is for agriculture, why is it unregulated and inefficient?," Observer Research Foundation, orfonline.org.
168 Ashton Gulati et.al., Getting more from less: Story of India's shrinking water resources, a joint report by NABARD and the Indian Council for Research on International Economic Relations (ICRIER), 2019.
169 Bharat R. Sharma, et al., Water productivity mapping of major Indian crops, NABARD, June 16, 2018.

Exhibit 17

Shifting rice and sugarcane acreage to states with low-depletion scores could significantly boost water sustainability.

Analysis: Rice and sugarcane cultivation levels vs water depletion levels



Source: Directorate of Marketing and Inspection (DMI) and National Horticulture Board (NHB) for years up to 2009–10 and National Horticulture Mission (NHM) and Ministry of Food Processing Industries (MoFPI) from 2009–10

By contrast, states in the mid-east receive significantly more rainfall and rely less on irrigation for the same crops. Their baseline water depletion scores are two-thirds lower than the top 12 states for water depletion. Shifting between 10 and 15 percent of this acreage to Bihar, Telangana, Chhattisgarh, West Bengal, Assam, and Odisha, which have less water depletion, could significantly boost the sustainability of India's water resources, and prevent severe economic and humanitarian crises in the long term.[170] A sustainable outcome could be accomplished through a variety of measures, including policy and large-scale procurement incentives (for consumers and cultivators) to shift acreage towards water-efficient crops (such as millet and maize) in highly water-stressed states. Investments in micro-irrigation and precision agriculture technologies (such as climate-smart agriculture, input optimisation through big data analytics, and IoT systems) could boost yield and water productivity. States could consider scaling up sugar factories and rice packaging and processing units to compensate for lower cultivation levels.

The advantage is that India receives sufficient rainfall, meaning that its water challenges can be solved through concerted measures without external support. By 2047, with comprehensive water management practices and new technologies, India could ensure access to water from an improved source (for example, on-premises piped water connection), free of contamination and available when needed, to all households across India. Meanwhile, to improve water re-use rates and reduce aquifer pollution, it could aim to increase the share of wastewater treated from 25–30 percent currently to 90–100 percent which is in line with global best practice.[171] India could also reduce its non-revenue water rate, including water leaks and unbilled water, from about 30–35 percent in 2021 to around 10–15 percent by 2047, in line with Asia's highly efficient water systems (such as Singapore and Phnom Penh).[172]

[170] Bharat R. Sharma, et al., Water productivity mapping of major Indian crops, NABARD, June 16, 2018.
[171] UN SDG 6 Dashboard.
[172] Asian water development outlook 2020: Advancing water security across Asia and the Pacific, Asia Development Bank, December 2020; R. Liemberger and A. Wyatt, "Quantifying the global non-revenue water problem," Water Supply, 2019, Volume 19, Number 3, pp. 831–837.

How India Inc. could help

India Inc. could set up an independent **national taskforce for water sustainability** to launch and implement a cross-sectoral programme for driving sustainable water use, improving distribution efficiency, and promoting water re-use and recycling across the private sector. This taskforce could be constituted comprising representatives from water-intensive industries (for example, pulp and paper, mining, chemicals, and oil and gas), utilities infrastructure and operators, and engineering solutions companies.

The taskforce could prioritise the following measures:

- **Drive industry-wide initiatives by** companies directly involved in the agricultural supply chain (for example, irrigation systems, chemicals and fertiliser companies, food producers, and textile manufacturers) to promote water-efficient agricultural practices across their supplier ecosystems. This could involve:
  - **Collaborating with farmers to adopt best-available germplasm,** especially for water-intensive crops such as sugarcane, wheat, and rice, which cover a significant proportion of India's cultivated area.
  - **Developing and marketing new food products (packaged or otherwise)** derived from water-efficient alternatives to wheat and rice such as millet, and sorghum, thus prompting farmers to shift acreage towards such crops.
  - **Scaling up investments in micro-irrigation** (such as drip and sprinkler irrigation) and promoting water-efficient agricultural practices such as no-till farming.
- **Undertake water-neutrality and zero-liquid discharge (ZLD) initiatives to reduce operating costs:** Guide companies in water-intensive industries (including pulp and paper, mining, chemicals, and oil and gas) to set net-zero water targets to drive more efficient water use and achieve savings by taking up advanced zero-liquid discharge projects (including treating all effluents in common effluent treatment plants).
- **Drive investments in supply and treatment technologies**: Establish a national consortium for water technologies to drive domestic production investments for:
  - Supply-altering technologies, such as desalination and atmospheric water generation.
  - Advanced water treatment technologies.
  - Online monitoring for leakage detection, including advanced analytics for strengthening water distribution networks.
- **Set and adopt water-budgeting standards:** The task force could facilitate creation of a common water stewardship standard for Indian companies or promote existing commonly accepted standards (such as the, Alliance for Water Stewardship's International Water Stewardship Standard) to enable companies sharing catchments and watershed basins to collectively quantify and map water use and water risk. This could not only promote sustainable extraction practices but also help with water budgeting for the area.

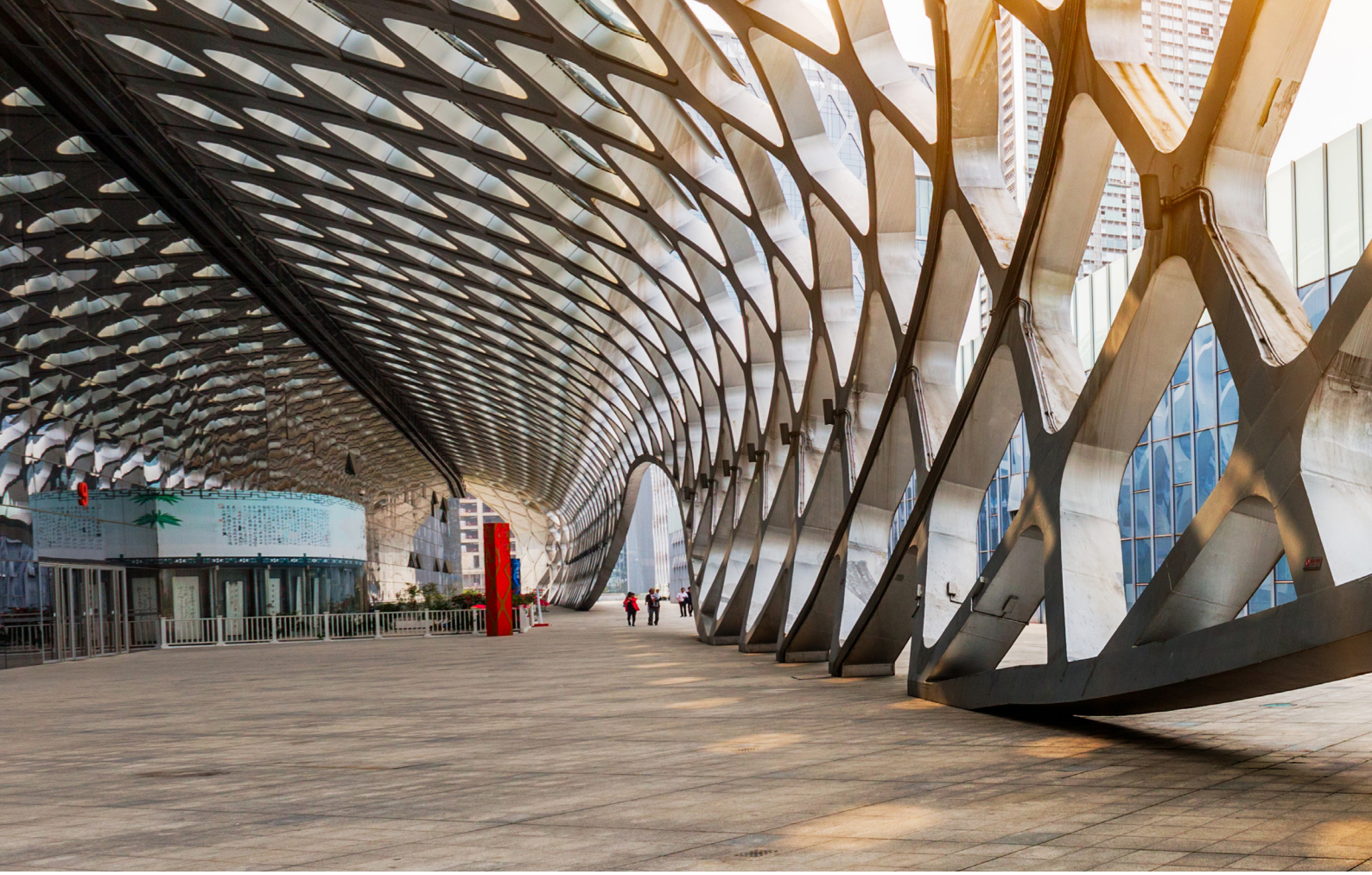
Ideas policymakers could consider to support India Inc.

Establish a market-making body, modelled after SECI, to promote public-private partnerships (PPPs) and private-sector participation in municipal water supply, distribution, and re-use projects, under the ambit of Jal Shakti Ministry. The key role of this body could be to:

- Aggregate demand across urban local bodies and state governments and facilitate deals between private infrastructure developers and public sector buyers, while reducing financial risk by acting as a credit intermediary.
- **Standardise bidding documents** for water projects across states and jurisdictions to include key provisions for enhancing PPP success, such as service-delivery standards linked to operational revenue, mutually agreed tariffs for end-users to improve financial viability, scope re-negotiation clauses in the event of poor data on brownfield projects, and so on.

Promote water-efficient agricultural practices: The central government could undertake both demand and supply side initiatives to drive acreage shift away from water-intensive crops (such as rice and wheat) towards water-efficient alternatives (such as millet, sorghum, and maize). To begin with, the Ministry of External Affairs and Ministry of Commerce could launch international outreach programmes, consider introducing production-linked incentives (PLI) schemes (such as the one announced for millets in 2022), and capitalise on the UN's declaration of 2023 as the International Year of Millet to promote alternative cereals.

Provide visibility to water data: To drive better data-driven water decision-making, the Central Water Commission, under the aegis of the Ministry of Jal Shakti, could spearhead the creation of an open national water database (showing both water supply and demand). For this, it could establish a water-consumption tracking system covering all users, watersheds, and catchment areas.



3.9

Infrastructure and logistics

Over the last decade, India has taken steps to accelerate infrastructure development across the country. Measures to improve planning include digital platforms such as the India Investment Grid[173] (launched in 2020) and PM Gati Shakti (introduced in 2022).[174] To expand infrastructure financing, the National Investment and Infrastructure Fund (NIIF) was launched in 2015, while the National Bank for Financing Infrastructure and Development (NABFID) was set up in 2021. Meanwhile, to fast-track implementation, the National Land Monetisation Corporation was launched in March 2022 as a central agency to coordinate surplus land pooling from central public sector enterprises. Other measures to streamline infrastructure development include the establishment of a single window for clearances, digitisation of land records, adoption of new PPP models, and granting the "priority sector lending" status to capital projects in housing, social development, and renewable energy.

[173] IIG is an online portal to connect investors and promoters, especially for National Infrastructure Pipeline projects. It currently hosts a project pipeline of more than $1.9 trillion.

[174] PM Gati Shakti is a digital platform that brings 16 ministries together for integrated planning and coordinated implementation of infrastructure connectivity projects.

These initiatives are expected to go a long way towards tackling critical challenges that have long beset the infrastructure sector. Private-sector investments in the sector have remained low for years: over 70 percent of financing is currently derived from the exchequer, and only 20 percent of funds for national infrastructure pipeline projects are expected to come from private investors.[175] Transport and urban infrastructure capacity has inhibited industrial and urban development for decades. The sector has faced challenges such as project delays, debt repayments, and cost-overruns (which currently average 23 percent of total project costs).[176]

If these challenges are addressed, the infrastructure sector could realise its full potential and contribute substantially to India's overall economic development. The construction sector alone has the potential to contribute 25 percent of incremental gross non-farm jobs by 2030.[177] Strengthening logistics and transportation infrastructure could bring down logistical costs from 13–14 percent of GDP to between 8 and 10 percent of GDP. Increasing rail's share of logistics from 27 percent to 40 percent by 2030 could help reach this goal.[178] India could also consider creating megaports (both bulk and container) with dedicated freight corridor connectivity.

Construction

The construction sector is a key driver of the Indian economy, contributing eight percent of total GDP and employing more than 50 million people. Further, the sector, together with manufacturing, is expected to the biggest contributor to productivity and jobs growth in the coming decade.[179] Logistics and transportation and urban infrastructure (especially housing) remain the two biggest components in the construction sector, contributing about 70 percent of the total $1,900 billion national investment pipeline.[180]

The government has undertaken a host of measures to improve the sector and support the welfare of workers, including skills development, recognition of prior learning, standardisation, and state welfare boards.[181] Some private organisations have become involved, with Larsen & Toubro establishing construction skills training institutes (CSTIs) to provide graded training in multiple trades.[182]

Challenges remain in the areas of construction quality, cost, and timelines, with significant over-runs observed for most projects. Further, the sector remains significantly fragmented and very few companies have become mega players, further holding back the sector's development. Most construction workers are unskilled, with casual labour accounting for more than 80 percent of the entire sector workforce.[183]

175 National Investment Pipeline, India Investment Grid website.
176 Review of infrastructure sector performance, Ministry of Statistics and Programme Implementation, April 2022.
177 India's turning point, an economic agenda to spur growth and jobs, August 2020.
178 "National rail plan vision – 2030," Ministry of Railways, March 2022.
179 India's turning point: An economic agenda to spur growth and jobs, McKinsey Global Institute, August 26, 2020
180 National Investment Pipeline, India Investment Grid.
181 Examples gathered from secondary research include some major initiatives in the form of Pradhan Mantri Kaushal Vikas Yojana (PMKVY) (multiple initiatives within such as Kaushal Bima Yojna, Recognition of Prior Learning (RPL) certification), e-Shram portal, state welfare boards for construction workers, Ayushman Bharat etc.
182 For more, see "Creating a skilled workforce across India," L&T Construction.
183 Annual report: Periodic labour force survey, Ministry of Statistics and Programme Implementation, June 2021.

How India Inc. could help

- **Upskilling construction workers:** Multiple institutions have implemented skilling programmes for construction workers. However, the uptake of skilling courses has been slow and needs to be accelerated, partly by skill recognition via accreditation and certification.

  Construction companies could mandate contractors to provide access to existing government or industry-body led skilling programmes. The mandate could be extended to accreditation and certification of skilled workers via recognition of prior learning certificates.[184] Government can support this by including worker skilling and accreditation in the bid evaluation criteria and payment terms in its tenders. Workers can be incentivised by remunerating them for job hours lost due to training as with Delhi's 'Mission Kushal Karmi' that compensates workers with ₹4,200 for lost wages when undertaking a 35-hour training programme.[185]

- **Develop land parcels for urban development:** Private developers could partner with urban local bodies to create shovel-ready land parcels for real-estate development, especially for affordable and value housing. While developers could build utilities and support infrastructure, urban local bodies (ULBs) could help secure requisite approvals. Such parcels can then be auctioned to real estate developers to realise returns. This approach could help to abate time and cost overruns and accelerate the ongoing development of social and urban infrastructure.

- **Implement project escrow mechanism:** Project escrow mechanisms could be implemented for government-backed construction projects. This would ringfence project revenues for utilisation within the project itself, with pre-defined withdrawal priority for working capital requirement, lender repayments, and statutory payments, among others. It could provide repayment comfort to project lenders (given prior visibility of government pay-out terms for the project) and help smaller developers to secure better lending terms. Escrow mechanisms have been successfully implemented in the real estate sector.

- **Transform construction via modularisation and digitisation:** Developers could adopt digital tools across the project lifecycle and industrialise construction by adopting modular designs, off-site fabrication or casting, and on-site assembly approaches. Doing so could raise productivity in the sector by up to 50 percent.[186]

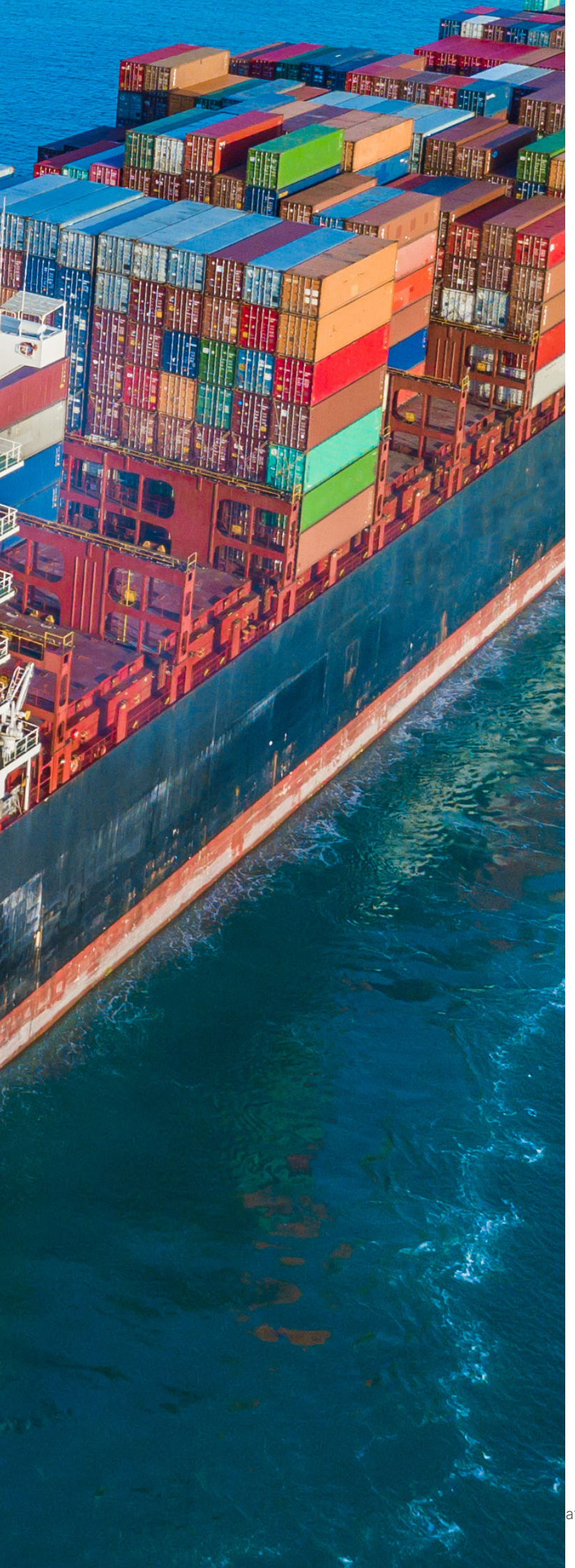
- **Registration of informal workers:** Construction companies could encourage contractors to register their workers on the e-Shram database for unorganised workers and the state welfare board. Companies can link a minor portion of contractor payment with such registration. This would allow workers to access benefits.[187] Currently, approximately half of cess payments for worker welfare collected under the Building and Other Construction Workers' Act (approximately ₹80,000 crores or $10 billion) remains unutilised due to the low number of workers' registrations.[188]

184 Issued under Pradhan Mantri Kaushal Vikas Yojana (PMKVY) as per the National Skill Qualification Framework.
185 "Delhi workers to provide skill training to construction workers," The Times of India, July 07, 2022.
186 McKinsey analysis. To calculate productivity levels for each sector, value-added was divided into hours worked by persons employed. Thereafter, value added was deflated to 2005 levels with sector-specific, double-sided value-added deflators.
187 One percent less (of the value of project) is collected under BOCW from the contractors before the start of project and deposited in the fund. The fund is managed by state welfare boards for worker welfare.
188 "States collected Rs 78,521 crore as cess from construction sector, 54.91% remains unutilised", Deccan Herald, 6th Feb, 2022.

Ideas policymakers could consider to support India Inc.

- **Upsize tender order values:** Government tendering department and agencies could parcel larger projects in major sectors (such as roads, railways, housing, telecom, and power) in the tendering process to build national capability in the construction sector. Tendering bigger projects would support project management capabilities for developers and catalyse improving construction technology and accelerating digitisation in the sector.
- **Incentivise construction companies to take up global construction projects to support their growth,** especially in Africa and the Commonwealth of Independent States (CIS). This could include easing access to low-cost financing, and aid in securing multilateral funding. Both China and Turkey have successfully managed to build a large global portfolio on the back of significant government support.[189,190]
- **Fast-track courts to expedite dispute resolution:** The dispute resolution process could be channelled to fast-track courts and specialised arbitration councils, instead of generalised courts, with dedicated infrastructure and public tendering experts. This could reduce the time take in the resolution process. Parallels can be drawn from the land acquisition courts in Australia, and technology and construction courts in the United Kingdom.[191]
- **Accelerate implementation of affordable housing schemes:** To accelerate affordable housing, city administrators could free up prime city land by relocating non-core infrastructure such as jails, zoos, landfills, warehouses, and more, from central to peripheral areas. They could also ease bylaws for parking and setbacks. The Pradhan Mantri Awas Yojana (PMAY) umbrella could include stalled projects to improve housing supply. Meanwhile, financing access to low-income groups could drive demand.
- **Set up a central urban infrastructure development agency:** Establish a central agency to help urban local boards with project structuring and to provide payment guarantees on their behalf. The agency could also help state government raise funds, especially via partnerships with multilateral agencies.[192] It could be partly funded through ringfencing allocations from various central schemes.

189 Tom Hancock, "How China plans to spend $1 trn on infrastructure to boost economy," Business Standard, August 26, 2022.
190 "Turkey unveils 30-year plan to improve transport infrastructure," Railway Technology, April 11, 2022.
191 For more, see "Technology and construction court" HM Courts and Tribunal Service.
192 Agencies with similar mandates already exist at the state-level, such as the Maharashtra Urban Infrastructure Development Company (MUINFRA) and Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC).



Logistics and transportation

Logistics improvement could significantly drive productivity and cost savings in the infrastructure sector. With 45 percent of investments projected under the National Infrastructure Pipeline earmarked for transport and logistics infrastructure, enhancing capacity and efficiencies in this sector is key.[193] The government has implemented major initiatives across the board, including augmenting air capacity, boosting rail traffic, easing the export process, and promoting drones. The recently released national logistics policy includes a comprehensive logistics action plan focused on integrated planning, logistics digitisation, human resources, inter-modal transport, and logistic processes.[194,195]

States vary significantly in terms of transport and logistics infrastructure. Gujarat, Maharashtra, Tamil Nadu, Punjab, Haryana, and Tamil Nadu have good logistics infrastructure such as roads, railways, cargo terminals, and warehousing facilities (Exhibit 18).

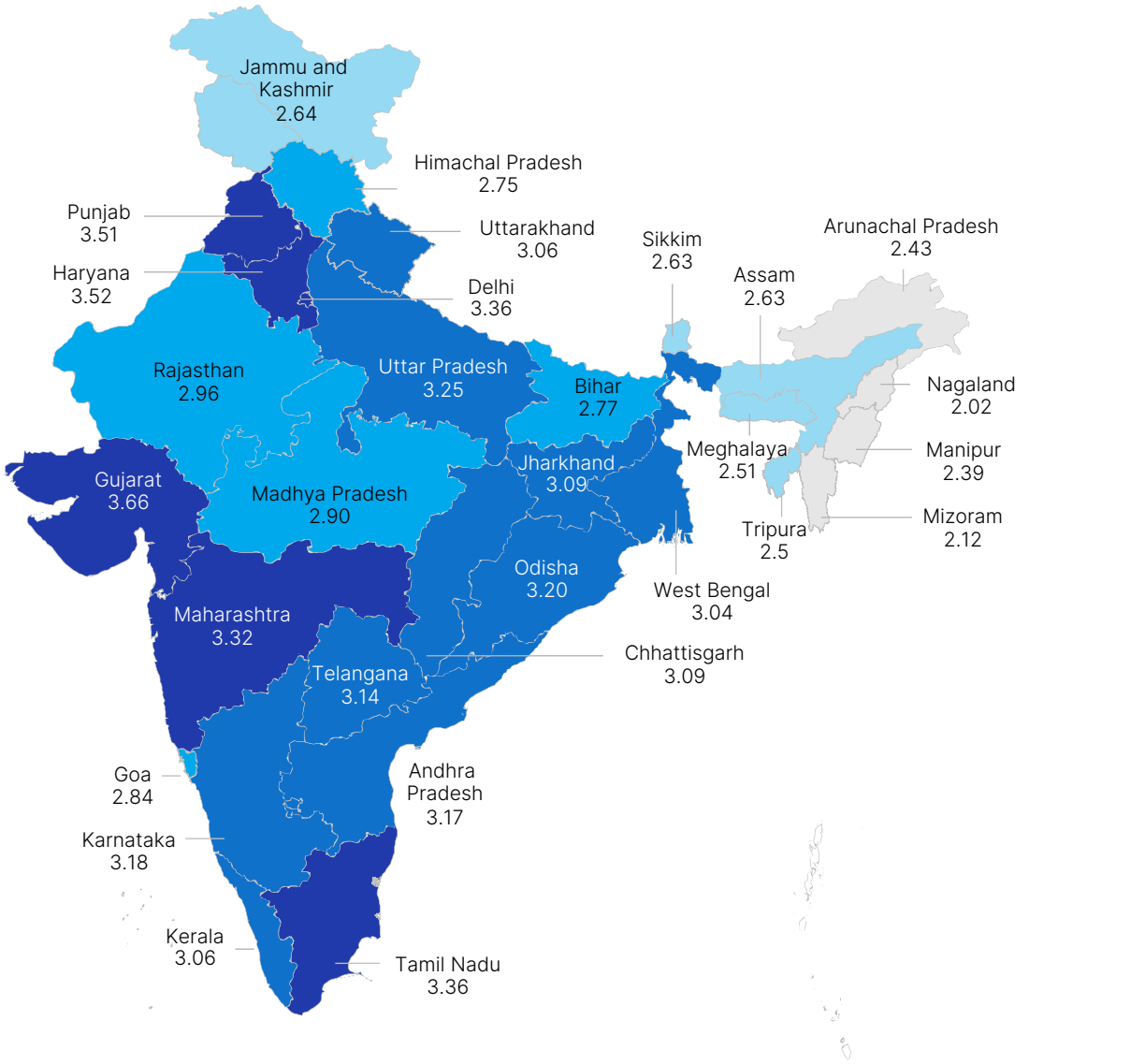
193 National Investment Pipeline, India Investment Grid website.
194 "PM launches National Logistics Policy," Government of India: Prime Minister's Office, September 17, 2022.
195 Maritime India vision 2030, a joint report by the Ministry of Ports, Shipping and Waterways and Sagarmala.

Exhibit 18

Wide variations exist between states in terms of availability of logistics and transport infrastructure.

Ease of logistics across different states (LEADS)

States such as Gujarat, Maharashtra, Tamil Nadu, Punjab, Haryana have moved ahead in terms of logistics infrastructure (roads, rail, port, container depots, warehouse capacity, personnel training in logistics etc)

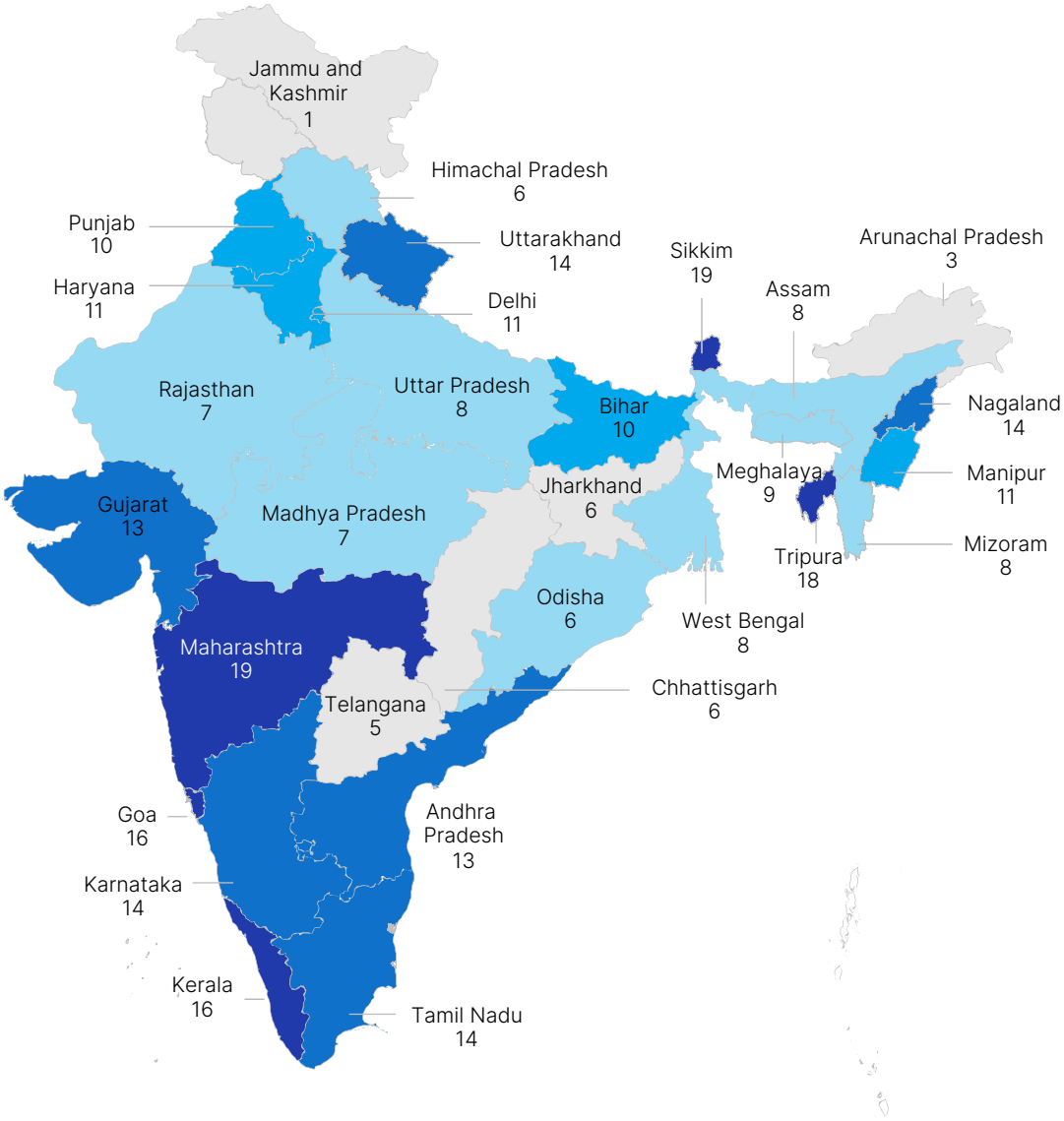


1. Logistics ease across different states.

Source: LEADS 2021, India Logistics, Ministry of Commerce and Industry, Government of India, October 12, 2021; Department of Commerce, Government of India; Ministry of Road Transport and Highways, Government of India

Highway density

Wide variations among states from ~8 km per 100 sq km in Punjab to ~3 km per 100 sq km in Madhya Pradesh



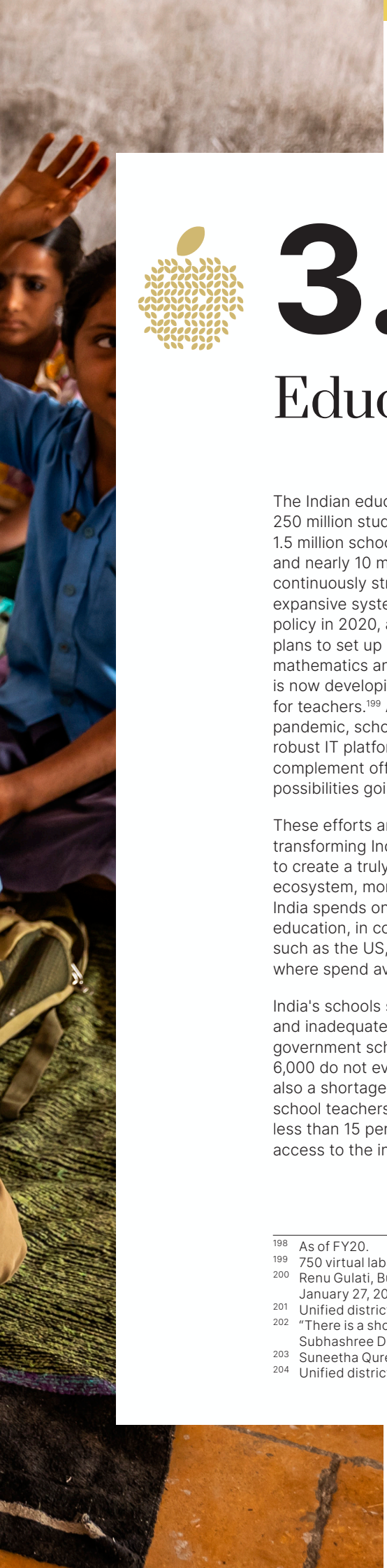
How India Inc. could help

- **Drive megaports-based industrialisation:** The government, in collaboration with industry bodies, could integrate major industrial clusters, free trade zones, and free trade warehousing zones with megaports through dedicated rail freight corridors and expressways. Manufacturing incentives and plug-and-play infrastructure could attract global manufacturing.
- **Set packaging standards:** Leading logistics and transport companies could support commodity-specific standards across cargo packaging, palletisation, and labelling. This could reduce cargo processing time and cost for both storage and transportation.
- **Electrification of last-mile logistics:** E-commerce, hyperlocal, logistics companies, could electrify last-mile delivery (especially **two wheelers**) by leveraging emerging EV models, creating awareness and providing favourable access to credit.[196] Full electrification of two-wheeler fleets by 2025 could cut total last-mile costs by about 15 percent annually and last-mile fuel and maintenance costs by at least 50 percent.[197] In parallel, an enabling policy framework for **drone delivery** could further strengthen the last mile delivery ecosystem.
- **Reduce trucking costs:** There could be an opportunity to promote hydrogen-based fuel-cells for long-haul trucking by creating refuelling infrastructure across highways, instituting minimum mandates for automotive manufacturers to produce hydrogen fuel trucks, and providing incentives for creating hydrogen infrastructure. Multi-trailer trucks can be deployed by locating major logistics hubs along highway frontage and creating dedicated electric lanes along major highways.

[196] For instance, NITI Aayog launched Shoonya campaign in 2021 to generate awareness for EV adoption in last-mile delivery.
[197] Hanish Yadav and Neelesh Mundra, "The many gains of electrifying e-commerce delivery fleets," Mint, November 24, 2021.

Ideas policymakers could consider to support India Inc.

- **Expand data access:** Building on the objectives of National Logistics Policy, the government could provide open data access to the logistics ecosystem to enable logistics players to develop big data solutions for freight-flow patterns, capacity planning, and supply chain development. For example, implement ULIP, bringing together government functionalities, logistics providers and customers on the same platform, helping to implement universal reference numbers to monitor cargo, optimize inventory levels, enable algorithmic price discovery, streamline tedious documentation process, fast-track approvals, enable IoT based cargo tracking etc.
- **Increase private participation in infrastructure:** Create a regulatory sandbox for testing innovative PPP models (such as allowing open access on selected railway segments and hybrid-till airport models), set up independent regulators in key sectors such as road, rail, metro, and urban infrastructure, adopt new financing mechanisms, and evolve PPP frameworks to incorporate more balanced risks and rewards. This would allow the government to use private sector expertise and funding.
- **Integrated infrastructure planning:** Promote integrated transport infrastructure planning across various modes (both freight and passenger), to prevent over-capacity, and improve financial viability and utilisation. This could entail active co-ordination among state governments as well as sectoral transport ministries.



3.10 Education

The Indian education system serves more than 250 million students through a network of about 1.5 million schools, 40 million graduate students, and nearly 10 million teachers.[198] India has been continuously strengthening this complex and expansive system. It introduced a new education policy in 2020, and this year announced plans to set up 750 virtual labs in science and mathematics and 75 skilling e-labs for adults, and is now developing national professional standards for teachers.[199] As a result of the COVID-19 pandemic, schools across India have developed robust IT platforms and virtual tools. These can complement offline learning and spark new possibilities going forward.

These efforts are likely to go a long way in transforming India's education system. However, to create a truly world-class student-centric ecosystem, more such initiatives are needed. India spends only 3.1 percent of its GDP on education, in contrast to advanced economies such as the US, the UK, Sweden, and Norway, where spend averages are about 6.5 percent.[200]

India's schools suffer from regulatory complexity and inadequate infrastructure. More than 200,000 government schools do not have a library and 6,000 do not even have a building.[201] There is also a shortage of at least 500,000 elementary school teachers and a large digital divide, with less than 15 percent of rural households having access to the internet.[202] Nominal interest rates on education loans for Indian students are also very high (at 10–14 percent) and higher education institutions lack internationally recognised accreditations. As a result, there are 800,000 Indians studying abroad, primarily for postgraduate courses, and only 50,000 foreign students enrolled in India, mostly for undergraduate courses.[203]

India's literacy rate is 73 percent; however, 11 states (including Bihar, Jharkhand, Rajasthan) fall below the national average (Exhibit 19). Currently, Kerala is the most literate state (94 percent), followed by Lakshadweep (92 percent) and Mizoram (91 percent).[204]

In the run-up to 2047, India could improve its higher education gross enrolment ratio (GER) to at least 60 percent, while maintaining gender parity, and its student-teacher ratio to 1:15 in primary and 1:20 in higher grades. It could also strive to increase student enrolment in vocational courses in Grades 6–12 to 100 percent, the number of international students in higher education to 300,000– 400,000 (from 50,000 currently). In addition, India could aim to develop 10 "student cities" with access to digital tools (including AR/VR headsets, tablets, and so on) and use modern pedagogies to capture future-looking requirements (such as simulation, gamified, or live projects). This could help to double deployable tech talent to about ten million by 2030 and create 90 million non-farm jobs by 2047.

198 As of FY20.
199 750 virtual labs, 75 e-labs for academics and skilling to come up in India, Elets Technomedia, February 8, 2022.
200 Renu Gulati, Budget: 'Need to invest significantly in higher education, encourage R&D', The Times of India, January 27, 2022.
201 Unified district information system for education plus (UDISE+) 2019-20, Government of India, Ministry of Education.
202 "There is a shortage of more than five lakh teachers in government schools, says CBGA, CBNC, July 25, 2018; Subhashree Das, "Digital divide biggest scourge in online study," The Pioneer, August 6, 2020.
203 Suneetha Qureshi, "Factors why experts forecast 1.8M Indian students abroad by 2024," MSM, September 28, 2022.
204 Unified district information system for education plus (UDISE+) 2019-20, Government of India, Ministry of Education.

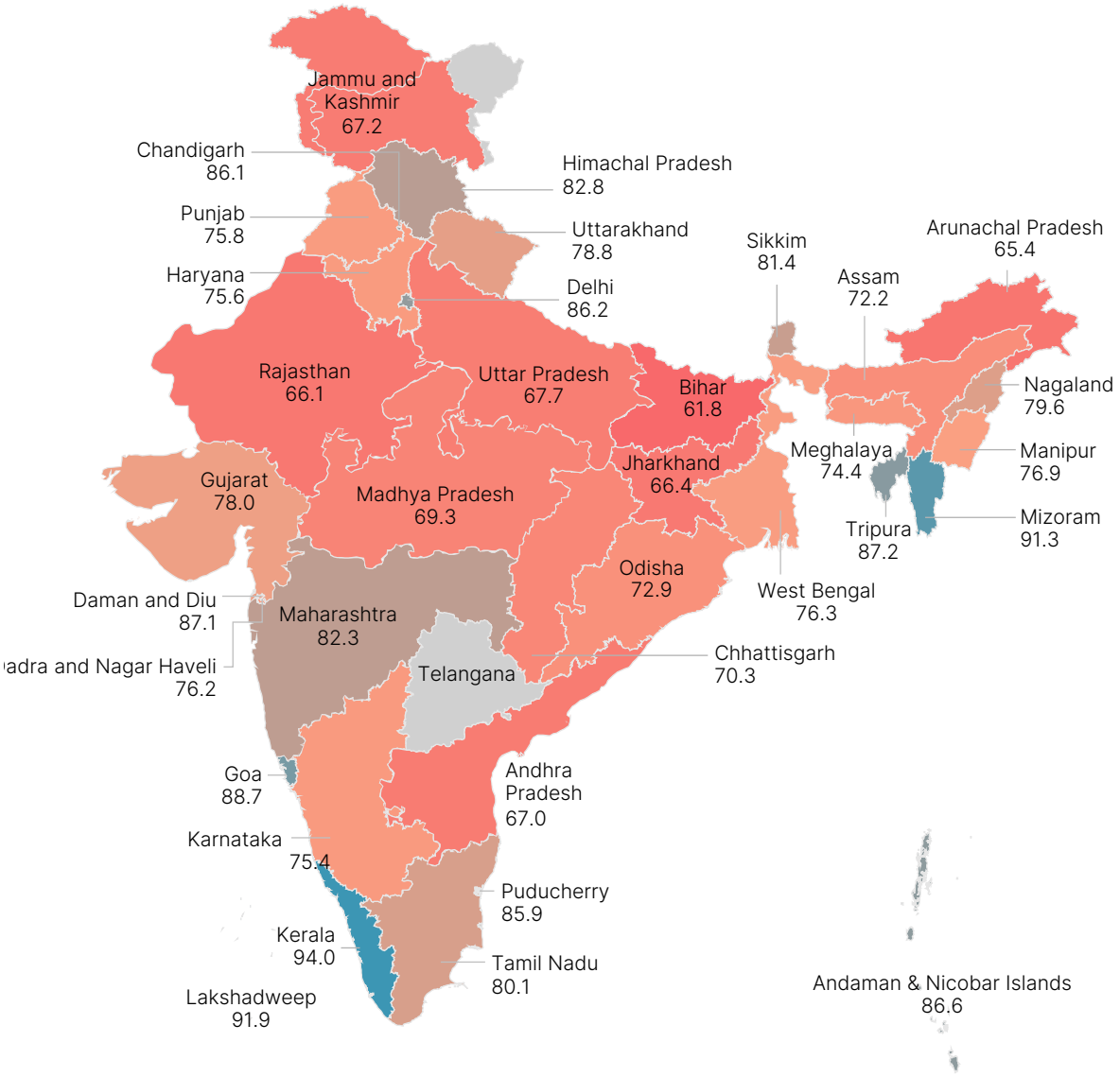
Exhibit 19

More than 30 percent of states fall below the national average literacy rate (about 73 percent).

State-wise literacy rate (%)

Kerala emerges as the most literate state (94%) followed by Lakshadweep (~92%) and Mizoram (~91%). Similarly, Bihar is currently at the bottom with ~61% literacy rate

61.8 — 94.0

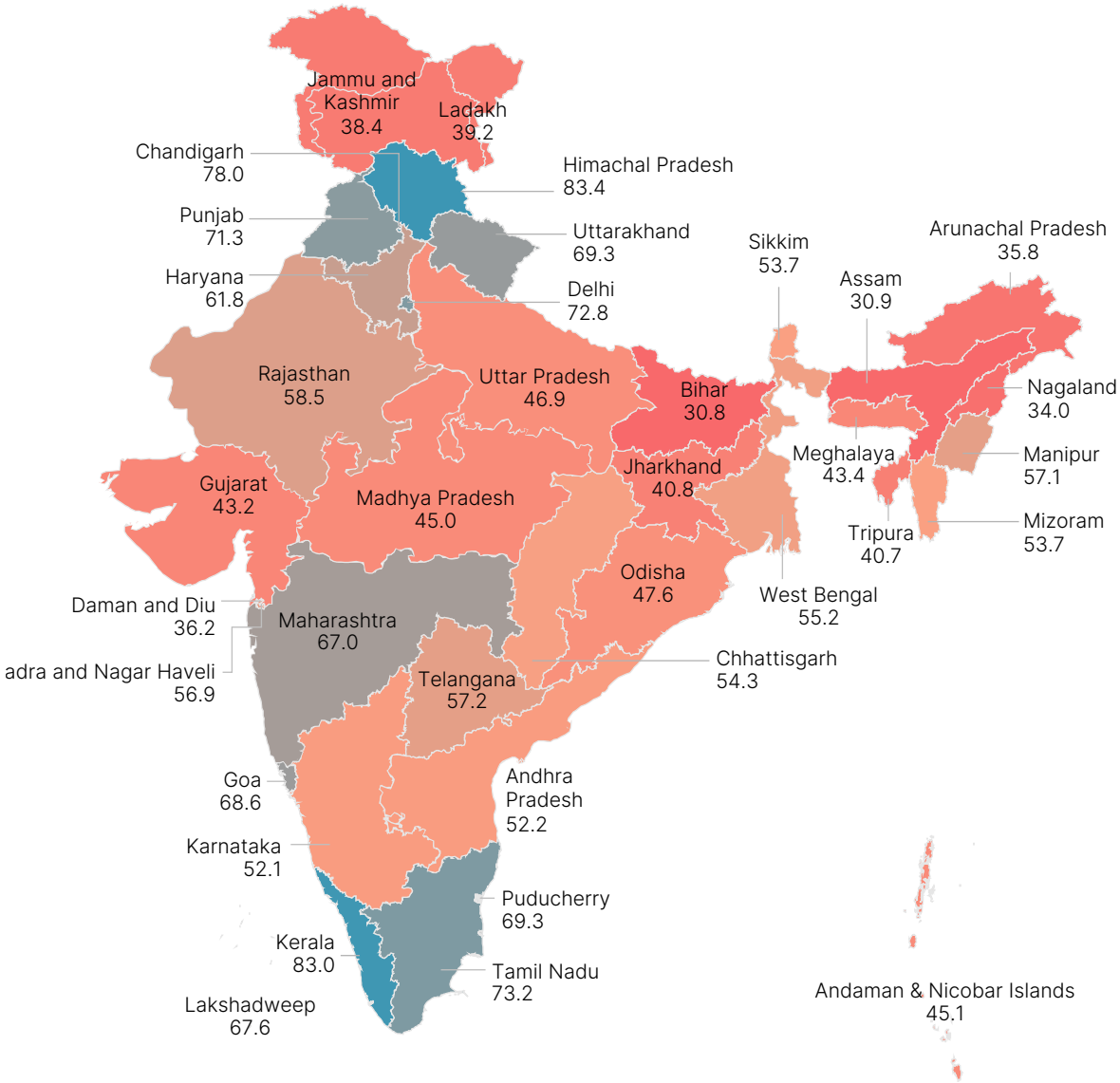


Source: Office of the Registrar General and Census Commissioner, Ministry of Home Affairs, Government of India; Unified District Information System for Education Plus (UDISE+) 2019–20, Ministry of Education, Government of India (UDISE+ is an updated and improved version of UDISE).

State-wise gross enrolment ratio for higher secondary education (%)

~50% of the states (e.g., Assam, Bihar) have GER less than ~50%, however, states such as Himachal Pradesh (~83%) and Kerala (83%) are leading the charts

30.8 — 83.4



How India Inc. could help

- **Develop a student-centric education model:** Education institutions could develop student-centric models by incorporating design thinking, role play-based teaching, leadership, digital and media literacy, and vocational modules, in their existing curriculums to facilitate dedicated job roles such as product manager, marketing and sales, and customer success. This could also support holistic student development by shifting from a "teaching-focused" to a "learning-based" education system.
- **Modernise learning infrastructure:** Institutions could comply with guidelines established by the School Quality Assessment and Assurance (SQAA) framework. They could also systematically assess and improve digital readiness of India's schools by introducing artificial intelligence and machine learning in learning, teaching and assessment, incorporating augmented and virtual reality content, developing central e-resources such as libraries and knowledge banks, and deploying predictive data and analytics solutions for mapping learning outcomes.
- **Bridge academia–industry gap:** India Inc. could collaborate with educational institutions to identify the gaps to meet industry needs and strengthen employable skills by jointly shaping the curriculum and offering practical apprenticeship such as financial education for banking and capital markets, basic tech literacy and programming skills, an overview of manufacturing technologies and upgrade medical curricula in association with the National Medical Council (NMC) to include digital healthcare.
- **Facilitate continuous professional development for teachers:** To ensure faculty development and satisfaction, leading educational institutes could create peer learning for teachers, raise salaries and benefits, build accelerated career-progression models, and provide opportunities to learn modern pedagogical approaches.

Ideas policymakers could consider to support India Inc.

- **Accelerate excellence and high-quality education:** An enquiry-focused school curriculum, strengthening the national skills qualifications framework (NSQF), a blueprint for integrating technology in curriculum delivery, and helping schools attain global quality assurance accreditations could all contribute to universal educational excellence. Higher education initiatives could include a flexible credit-based curriculum system, a unified platform for internships and placements, and integrating vocational education into the curriculum.
- **Enhance digital and physical infrastructure:** The central and state governments could provide high-speed broadband connectivity and hardware support to all government schools, build standardised technology solutions, and develop low-cost digital platforms (such as LMS and ERP) to improve academic and operational efficiencies and to strengthen digital infrastructure in schools. They could also help develop research-focused higher education institutes by activating research communities, providing funding to autonomous research institutions, and incentivising research in themes that align with India's growth and well-being.
- **Improve teaching quality and effectiveness:** Developing a transparent process for recruitment and training, equipping teachers with the latest technologies, developing a continuous teacher skill assessment process, and mandating "training the trainer" programmes in government schools could support a national teaching community. A centre of excellence, in partnership with the education sector and global institutions could train incoming teachers on global best practices.
- **Strengthen governance and investment framework:** A hub-and-spoke mentorship programme between low-performing and high-performing schools, attracting international students through a Study in India initiative, satellite institutes abroad and vice-versa, harmonising policies, expanding scholarships, and encouraging partnerships between schools and edtech companies could all create an enabling environment for education.

Seed incubators and new technology markets

The next wave of industry growth will be led by various nascent frontier technologies that hold the potential to offer significant value to the Indian economy. These technologies look to revolutionise India's economy, and their timely adoption could help India establish global leadership in respective sectors.

For instance, India's biotechnology industry, with a market size of $80 billion, is currently twelfth in the world and third in Asia with over 3,500 start-ups, and the industry's growth is primarily driven by vaccines and recombinant therapeutics.[205] The biotechnology sector is essential for providing innovative solutions for healthcare, agriculture, environment, and industrial processes. Similarly, the global space economy (a $420 billion industry in 2020)[206] could create opportunities for technological expansion and could unlock services from orbit such as satellite broadband, and manufacturing.[207] Indian Space Research Organisation (ISRO) could improve utilisation of its existing launch pads and create new launch pads in partnership with the central government and space companies.

The metaverse is also emerging as a powerful concept with global investment of $120 billion in 2022 so far, more than double the investment made in 2021.[208] It has the potential to transform social interactions, business dealings, and the internet economy at large. India could capitalise on this industry by leveraging its growing digital economy in e-commerce, virtual learning, advertising, and gaming, following a similar path as that taken by China, South Korea, and western countries. Other forward-looking next-generation technologies could become important, such as augmented and virtual reality (AR/VR), quantum computing, and digital twins, and demand and use cases for next-generation materials is rising, both globally and locally.

205 "National biotechnology development strategy (2021-2025): Knowledge and innovation driven by bio-economy," Department of Biotechnology, Ministry of Science and Technology, 2020.
206 The Space report 2021, Quarter 2: The authoritative guide to global space activity, Space Foundation.
207 Ibid.
208 Value creation in the metaverse: The real business of the virtual world, McKinsey, June 2022.

How India Inc. could help

To capture these next generation technologies, India Inc. could strengthen its base and leapfrog its global peers in partnership with government and academia:

- **Set up world-class innovation clusters** where capital, expertise, and talent could collaborate to propel innovation by supporting new or nascent technologies and industries.
- **Drive large scale skilling and reskilling campaigns** in association with edtechs to empower students and employees with disruptive technology concepts.
- **Boost investments** in next generation technology (such as the metaverse, gaming, and retail experiences) through increased research and development, innovation competitions, and mergers and acquisitions.
- **Provide key regulations** in collaboration with industry on next-generation technologies, build regulatory sandboxes for free experimentation of new technologies, and streamline regulatory framework for private participation in space sector.
- **Collaborate with multilateral forums** to promote India's capabilities on global platforms.

Across these imperatives, at least 60 percent of the reforms could be led by states, with active participation by India Inc.[209] A few states offer examples of the strategic planning necessary to unlock growth across sector priorities. Maharashtra, for instance, has established a close-knit network of manufacturing and agricultural clusters that tap growing urbanisation and use local state resources (Exhibit 20).

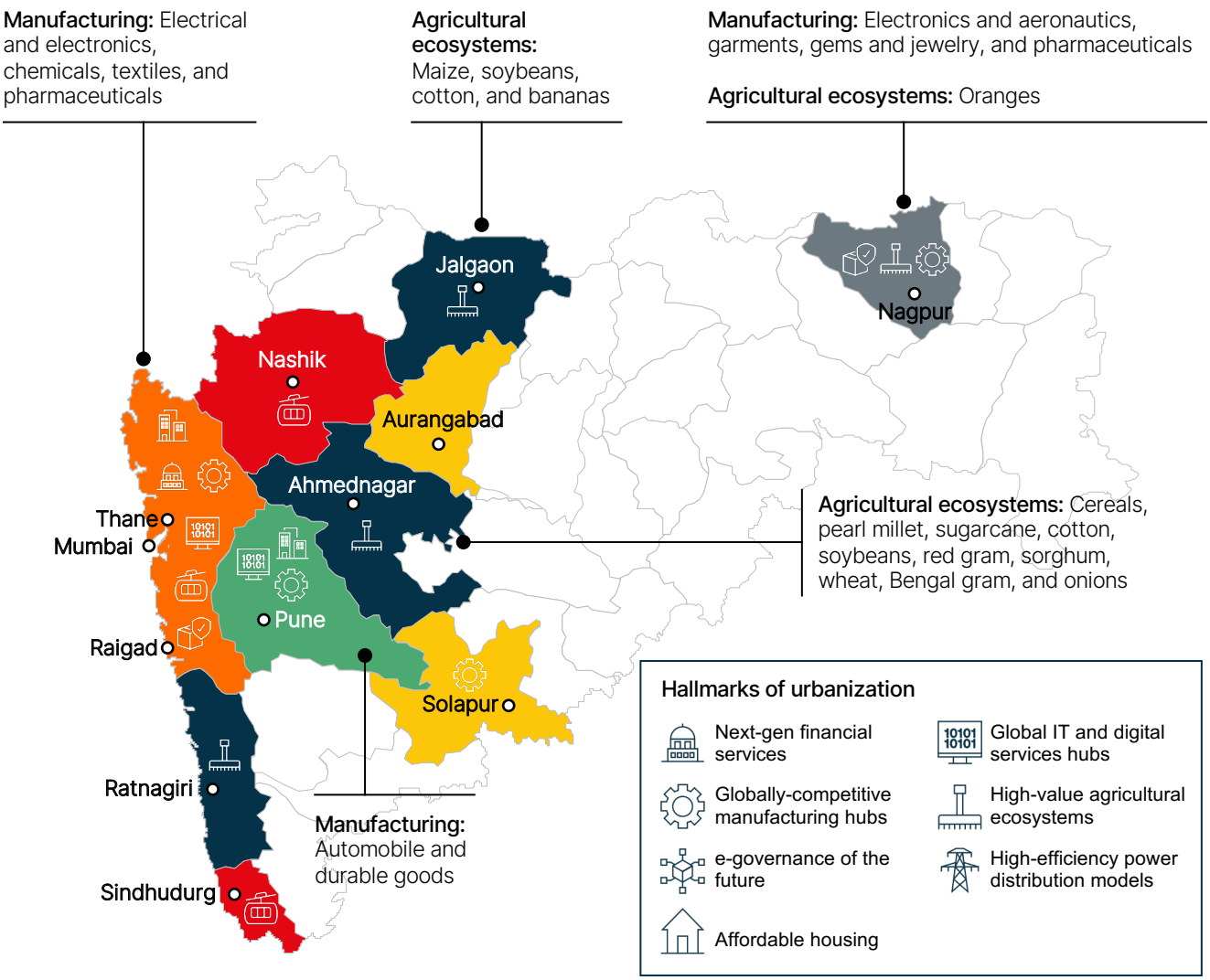
State governments could select high-performing sectors and enable high-productivity enterprises to flourish to create more competitive businesses and gainful work opportunities.

Following these ten priorities and sector-wise actions, four essential capabilities to empower India to achieve this potential have been outlined.

[209] "India's turning point: An economic agenda to spur growth and jobs, 2020.

Exhibit 20[210]

Maharashtra – Clusters can be enabled by growing urbanization



[210] India's turning point: An economic agenda to spur growth and jobs, McKinsey Global Institute, August 26, 2020.

04

Building capabilities to turn vision into reality

Industry leaders and state and central governments could collaborate over the next 12 to 18 months to build four critical capacities across the priority sectors. These capabilities include:

- India Inc.'s innovation quotient.
- The evolution of India's small and medium enterprises (SMEs) to become global challengers.
- The next generation workforce's talent and skills to earn a meaningful livelihood.
- The ability to attract investments to fund all the initiatives towards India's Century and beyond.

Fostering innovation through capacity building

India has increased its investment into science and technology and has substantially improved its ranking in the Global Innovation Index from 81st in 2015 to 46th in 2022.[211] Initiatives such as the Space Mission, National Supercomputing Mission, the Semiconductor Mission, Mission Hydrogen drones, and the new technology curriculum for schools support the development of an innovation ecosystem. However, the research and development (R&D) sector continues to rely on government. Companies account for less than 40 percent of R&D spending, compared to over 65 percent in the most R&D-intensive economies.[212] Scaling up participation of the private sector to double R&D investment by 2030 could establish India as a leading innovation hub in areas of national importance, such as digital healthcare, agricultural technology, water treatment, clean energy, hydrogen, and more.[213]

Achieving this could require large-scale capacity building for organisations to develop, deliver, and scale new products, services, processes, and business models rapidly. Our analysis has shown a strong positive correlation between innovation performance and financial performance, and to realise these returns, we propose two key measures: raising India's "innovation quotient" and establishing "innovation clusters" to collectively drive innovation through collaboration between private and public stakeholders.

Assessing innovation quotients to help companies stand out

To know where they stand as innovators, companies can now check their innovation quotient. This benchmarks company readiness, strengths, and execution capabilities for innovation compared to peers. It generates relevant, company-specific insights to help leaders strengthen their companies' innovation capabilities in line with best practices followed by global frontrunners. The quotient was launched as part of India's Century.[214]

The innovation quotient (IQ) measures the preparedness and ability of an organisation to innovate. A company's IQ is a composite of eight crosscutting prerequisites, or essentials, for innovation, and broadly reflects two factors: first, whether the company experiences the conditions under which innovation can easily occur, and second, whether it is able to deliver sustained value through innovation (Exhibit 21).

Raising India Inc.'s collective IQ might accelerate India's overall economic growth. In addition to its potential for exporting innovative products and services, India could also be better placed to solve its own unique challenges. By adopting best practices, companies could move from being customer-focused innovators to becoming champions of breakthrough discoveries.

211 Global Innovation Index 2022: What is the future of innovation-driven growth?, World Intellectual Property Organization.
212 "India needs greater thrust on innovation to become the third largest economy, especially from the private sector," Ministry of Finance, January 29, 2021.
213 Centre-State Science Conclave, September 2022.
214 The innovation quotient is a proprietary McKinsey tool. The results have been included in this report to show how India can improve its innovation.

Exhibit 21

Indian companies could upgrade their "innovation quotient" by mastering the eight essentials of innovation.

IQ assesses maturity of innovation practices of companies on a scale of 1 to 5, through a self-assessment survey rolled out to key stakeholders

1. EP — economic profit (EP) measures the total value created by a company above the opportunity cost of the capital needed to create it. It is calculated by taking net operating profit less adjusted taxes (NOPLAT) and subtracting capital charge (total invested capital divided by weighted average cost of capital, or weighted average cost of capital (WACC))

The inaugural version of the Innovation Quotient survey covered over 130 responses from executives across three sectors: fast-moving consumer goods, life sciences, and information technology.[215] The questionnaire assessed adherence to key practices for innovation capabilities.

The companies surveyed demonstrated four key strengths:

- **Constant consumer focus:** The companies conduct rapid market research to identify unmet customer needs and proactively recognise and rework failing business models in line with consumer behaviour and technology trends. For example, the CEO of a large FMCG said that their company sought customer insights and feedback at several stages of the innovation cycle.
- **Optimised offerings for at-scale launches:** The companies are able to rapidly launch new offerings in global markets by involving their marketing function early on and launching pilots before full-scale rollouts.
- **Internal idea sourcing:** The companies run robust internal ideation engines, with leadership emphasising the need for new ideas and the communications teams continuously reinforcing the company's reputation for innovation. A consumer goods chief executive said that their employees are confident that their failures will only be viewed as milestones towards their journey to innovation success.
- **Innovation aligned with organisational priorities:** Many companies have robust frameworks to identify and fund innovation that aligns with their strategy, capabilities, and organisational goals.

215 The survey included the CEO and direct reports, senior management, and middle management of both small and midsize companies (those with less than $500 million in revenue and between $500 million and $5 billion, respectively) as well as large companies (those with revenue more than $5 billion). Innovation survey, McKinsey, 2022.

The survey also identified five areas of improvement for the companies, where best practices can be instituted to boost the pace of innovation and returns on investment in new ideas.[216]

- **Use quantified metrics and create accountability:** The companies could institute time-bound, innovation-linked quantitative targets for innovation performance (such as net new revenues and earnings growth) for operating units. These targets could be complemented by increasing managerial accountability. For instance, one global conglomerate designed a benchmark margin target for all new product launches and links management bonuses to this target.
- **Strengthen project governance:** Innovation-programme management offices (such as a central innovation cell reporting to the chief technology officer), staffed with various functional stakeholders, could periodically review project progress and prevent decision-making ambiguity.
- **Adopt risk mitigation practices:** To de-risk new offerings and ensure market success, companies could adopt rapid testing protocols, implemented by cross-functional squads charged with key features such as packaging. They could also build fail-safes into their final products, such as new feature toggles for software. As an example, a leading global shoe manufacturer accelerated its product rollout through iterative experimentation.
- **Differentiate priorities:** Companies could identify an optimal mix of different innovation priorities including breakthrough IP, profit diversification, and incremental product improvements. They could then build their organisational structure around innovative product categories or themes. This could help ensure an optimal deployment of talent and resources across the innovation portfolio.
- **Source external ideas:** Building formalised systems to absorb ideas and utilise the wider ecosystem of collaborators, including suppliers, start-ups, and academia, could help companies learn new ways of doing business and build innovation partnerships.

[216] The survey included the CEO and direct reports, senior management, and middle management of both small and midsize companies (those with less than $500 million in revenue and between $500 million and $5 billion, respectively) as well as large companies (those with revenue more than $5 billion). Innovation survey, McKinsey, 2022.

Innovation clusters to focus on partnership in critical sectors

The establishment of **sector-focused innovation clusters** could improve the odds of success a start-up, thereby enhancing the innovation environment in India. Innovation clusters will be set up at a particular location or a group of locations where pool of capital, expertise, and talent will develop indigenous green technology, and research commercialisation for large-scale deployment. For the first phase, clean energy, smart mobility, and water adequacy in agriculture have been prioritised. Second phase clusters would be focused on new technologies, including metaverse, AI and machine learning, 3D-printing, electronics manufacturing, and life sciences. The third phase could include space technologies, next-generation materials, and quantum computing.

Innovation clusters could be governed by the innovation cluster management body, an independent body with stakeholder representatives, and guided by an advisory board. Setting up and empowering innovation clusters in India will require action across various stakeholders:

- **Setting up an independent innovation cluster management body:** There could be a lean IC management body with an entrepreneurial team that can integrate multiple stakeholders across government, industry, and academia and would be responsible for ensuring smooth functioning of the innovation cluster. It could enter into global partnerships, implement strong performance-monitoring and evaluation mechanisms, and mentor start-ups.
- **Setting up infrastructure:** The government could earmark land for the innovation cluster along with basic infrastructure such as roads, water and power supply, network connectivity, and waste management. Industry bodies could partner with the government to set up shared R&D infrastructure such as design, prototyping, testing, and certification laboratories.
- **Establishing funding schemes for innovation and incubation:** Idea owners (start-ups) would have an opportunity to receive seed funding from investors or industries during pitch days or innovation challenges. In addition, government schemes such as Atal Innovation Mission, Startup India seed fund etc., could support start-ups through cluster management. Consistent policies to assess innovation with a focus on late-stage research and insurance via capped returns for government could balance downside risk for industry or foreign investors.
- **Role of academia:** While Indian academia has shown good performance in reaching TRL of 3-4 with their technologies consistently, startups are much better placed to take technologies into TRL 4-8 bridging the TRL valley of death. Academic institutions can provide start-ups and cluster participants with access to testbeds and infrastructure, as well as projects with their expertise and faculty resources. Start-ups, meanwhile, could take technologies into commercialisation and proofs of concept. Academic institutions could also provide industry-relevant skills for students and outcome-based funding for research projects, i.e., stage-gate funding with pre-defined milestones.
- **Underwriting risk:** The government or industry bodies could underwrite risk for start-ups by funding R&D projects (milestone-based pay-outs) with product offtake contracts and royalties on sales.
- **Organising R&D symposiums:** The innovation cluster body could organise meetings to showcase the latest innovation globally and attract investors.

Clusters can be located close to talent hubs with easy access to industry and investors. Each cluster could have multiple physical locations with shared infrastructure.

As part of the India's Century initiative, the first such cluster is being planned.[217] A partnership between industry, academia, and government, this cluster would focus on clean energy, including waste to energy, alternative energy storage solutions, improved technologies for lower-cost production, transportation of green hydrogen, decarbonisation in high-emission sectors, and more.

As the world transitions to renewable energy, India has the potential to become one of the most competitive green energy producers thanks to multiple tailwinds and endowments. This includes ambitious climate targets by government and corporates including plans for net zero greenhouse gas emissions by 2070 and policy support for renewable energy and green hydrogen (e.g., ISTS waiver, PLI etc.).[218] Additionally, baseload renewable energy is already cheaper than thermal power on full cost, and the cost is expected to decline further in the next five to seven years.[219]

However, there are roadblocks in terms of heavy reliance on technology imports and limited R&D.[220] If this is not addressed, there is a risk of input shortage and disrupted value chain.

[217] The cluster's launch is being discussed with relevant stakeholders and is subject to approvals.
[218] "India's stand at COP-26," Ministry of Environment, Forest and Climate Change, February 03, 2022.
[219] "Renewables increasingly beat even the cheapest coal competitors on cost," International Renewable Energy Agency, June 02, 2020.
[220] For instance, India imports between 80 and 90 percent of its solar modules. At this level, the import bill could reach $300-400 billion in 2050.

The clean energy cluster could focus its innovation and research on:

- **Advanced solar and wind technology:** Adapt (to Indian conditions) and scale up manufacturing of high efficiency and cost-effective innovative technologies pertaining to advanced solar PV, wafers etc., to reduce reliance on imports. Polysilicon production through new techniques (e.g., FBR) and solar materials such as solar paints, solar skins, solar fabrics etc., provide opportunities to quicken up the net zero ambition. Innovative blade manufacturing techniques and materials (e.g., flower turbines that occupy less space, additive 3D printing, fibre composite laminate layering, thermoplastic skins, etc.) also contribute significantly to India's 2070 vision.
- **Alternate energy storage solutions:** Accelerate scale-up of indigenous manufacturing of storage solutions i.e., lithium-ion and innovate alternate energy storage solutions e.g., sodium-ion, redox flow, zinc-air, salt based, vanadium flow, solid-state electrolyte-based batteries (crystal sulfur, polymer based etc.), thermal energy storage etc.
- **Smart asset management:** Build smart asset management solutions such as smart metering, digital twin, grid solutions (AI/ ML for grid analytics and management), robotics-based automatic operations and maintenance, blockchain-based tracking, and grid integration for efficient energy transmission at a reduced cost.
- **Waste to energy:** Techniques producing syngas (e.g., Gasification, plasma gasification, Dendro liquid energy) and biofuels (e.g., agri-residue based diesels, biomass pellets, brickets etc.) have potential to curb emissions in energy intensive sectors.
- **Green hydrogen:** Adopt and scale up manufacturing of high efficiency and cost-effective electrolysers (AWE, PEM, SOEC, etc.), fuel cells, storage, and transportation solutions to enable low-cost production and transportation of green hydrogen to become global exporters.
- **Carbon capture, utilisation, and storage (CCUS):** Innovation in financially viable CCUS technologies to facilitate decarbonisation in emissions-heavy sectors such as power, cement etc.

Scaling up India's companies into global challengers

India has a "missing middle" – a dearth of midsized firms with revenue between $40 million and $500 million that typically grow into formidable competitors for large companies (Exhibit 22).[221] Compared to other "outperformer" peer economies, India has between a half to two-thirds as many midsize and large firms.[222] In countries such as China, Malaysia, and Thailand, rated as outperformer emerging economies, large firms' contribution to GDP is 1.5 to 1.6 times higher per trillion dollars than in India, and the contribution of midsize firms is 1.9 times higher. In addition, India's large companies lag behind their peers in productivity and profitability. India could bridge this gap by nurturing about 10,000 small firms to become midsize and about 1,000 midsize firms to large by 2030.[223]

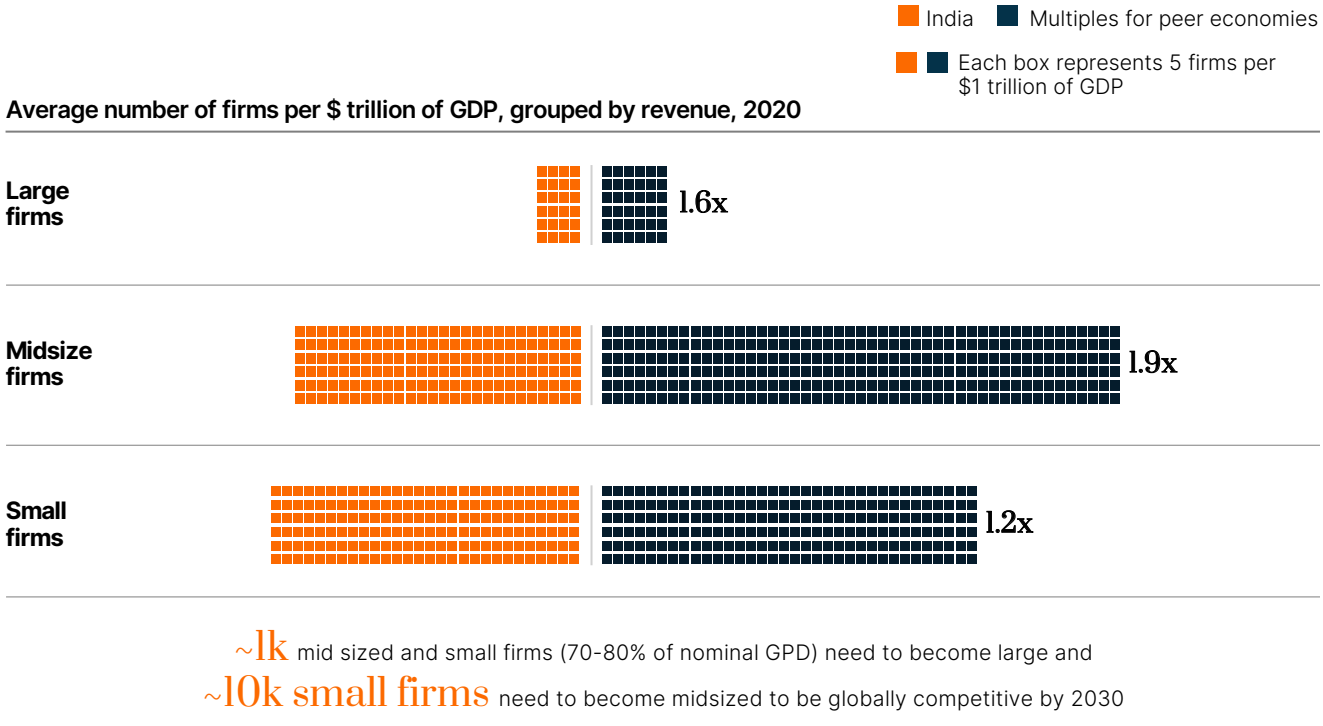
India could empower small and midsize companies to reach their potential with greater access to finance and technology, improved ease of doing business, cluster development, promotion and marketing support, and capability-building.

[221] Large-sized firms are companies with revenue of more than $500M. Large firms in India empirically have 11 times higher labour productivity than the overall economy. They are 2.3 times more productive than midsize firms and their profitability is 1.2 times greater. Source: India's turning point: An economic agenda to spur growth and jobs," McKinsey Global Institute, August 26, 2020.
[222] Includes China, Malaysia, Thailand, South Korea, and Vietnam.
[223] For more, see "India's turning point: An economic agenda to spur growth and jobs," McKinsey Global Institute, August 26, 2020.

Exhibit 22

India has a missing-middle of midsized firms.

India has only about one-half to two-thirds as many midsize and large firms compared to other "outperformer" emerging economies, per $1 trillion of GDP



~1k mid sized and small firms (70-80% of nominal GPD) need to become large and
~10k small firms need to become midsized to be globally competitive by 2030

Source: McKinsey analysis, MGI India's Turning Point

1. **Unlocking increased access to finance:** By 2030, India's small and midsize companies will need access to more than $800 billion in capital.[224] Expanding the account aggregator (AA) framework to include both financial and non-financial data across multiple sources could be used to build digital lending solutions to foster the financial inclusion of micro, small, and midsize enterprises (MSMEs). Continuing government credit guarantee schemes for this sector could also provide support.

2. **Improving ease of doing business:** Policymakers could create state-wide one-stop shop portals for government-to-business services, such as business registration. Government could also ease compliance requirements with online approvals, harmonised license renewal across departments, and self-certification. Kerala and Haryana allow MSMEs to apply for approvals and clearances within the first three years of their operations.[225] In addition, states could offer guides, tutorials, and dedicated staff to help new companies navigate requirements.

3. **Access to technology:** Private companies could offer solutions to enable small businesses to integrate with the Open Network for Digital Commerce and the Government e-Marketplace, personalise customer experience, and optimise their operations including inventory planning and supply chain management. As an example, Amazon India launched the 'Kala Haat' program in collaboration with the government of Uttar Pradesh to provide a global platform to 750,000 weavers and artisans.[226] It also provides training, account management guidance, marketing tools, and world-class infrastructure, including a storage and delivery network, to aid their progress through online selling.

4. **Cluster development:** Industry could collaborate with the MSME Ministry to support the Micro and Small Enterprises Cluster Development Programme (MSE-CDP) to scale up manufacturing hubs.[227] For instance, Uttar Pradesh's One District One Product programme for agriculture, food, and textiles could be scaled across other states and promote exports under the Made in India brand.[228] China has a similar initiative with professional towns and villages functioning as production hubs for individual products, enabling economies of scale.[229] This could include common facility centres for production, processing, design, and testing, as well as infrastructure development centres for power, water, transport, and more.

5. **Providing export promotion and marketing support:** India's private sector could partner with institutions such as the National Resource Centres (NRCs) and Export Facilitation Centres (EFCs) to create commodity-specific digital platforms for global selling, provide export intelligence, and launch certification programmes for standards compliance.

   India could take inspiration from Turkey's brand-building Turquality program, which has enabled more than 300 companies across 20 industries to export branded products to more than 150 countries. These companies now generate more than 5 percent of Turkey's exports and have achieved double the export trade value compared with the national average.[230] Similarly, India could aspire to promote its branding under Made in India.

6. **Offering capability-building:** Private companies could provide both in-person and online skills training for transformation in business, organisation, and technology. Themes could include digital transformation, lean manufacturing, leadership effectiveness, agile methodology, change management, and technology skills.

With these supportive measures, SMEs could scale up their GDP contribution from 30 percent to 50 percent, matching global standards.[231] These measures would also raise the number of midsized firms that could compete with larger companies, especially in sectors such as manufacturing, construction, and trade which contributed around 30 percent of India's GDP in 2020 and whose SME segments have a high potential to scale up (Exhibit 23).

[224] Ibid.
[225] P.S Gopikrishnan Unnithan, "Kerala to ease procedures for MSMEs, can operate without license for 3 years," India Today, April 06, 2022.
[226] Sangeetha Chengappa, "Amazon's Kala Haat weaves magic for India's textile traditions," The Hindu Business Line, August 14, 2018.
[227] Fewer than half of the 200 common facility centres approved have been completed. Source needed for this development programme.
[228] Source needed.
[229] One town one product (OTOP) project in China supervised by Small and Medium Enterprise Administration (SMEA).
[230] Turquality website.
[231] All India Management Association.

Exhibit 23

India could prioritise various sectors that have high potential for small and medium-sized enterprises.

High Moderate Low

Sectors	Potential to scale (2030)	Industry size[4] (2020–$)	Industry CAGR (2020–2030)	Contribution to India's GDP (2020)	Potential to influence	Priority[5]
Manufacturing[1]	3x	~1469	12.1%	~14.2%		
Construction and real estate	4.5x	~455	12.1%	~6.8%		
Trade[2]	4.5x	~317	11.7%	~9.0%		
Travel, transport, and logistics	5.5x	~200	12.1%	~3.6%		
Healthcare	11x	~134	12.8%	~2.9%		
Financial services and insurance	1.2x	~244	14.0%	~10.3%		
Telecom, technology, and media	3x	~182	10.7%	~7.7%		
Oil and gas	2x	~217	13.2%	~2.2%		
Mining	2x	~65	6.9%	~1.7%		
Power	2x	~80	13.0%	~1.4%		

1. Manufacturing includes automotive, auto-components and advanced industries, basic materials, cement, chemicals, consumer goods, manufacturing of electronics, pharmaceuticals and medical products, steel, textiles, and other manufacturing.
2. Trade includes wholesale and retail trade, hotel and restaurant, and entertainment.
3. Large firms are firms that g revenue greater than $500 million in FY18.
4. Industry size and CAGR is based on total sales (gross output), nominal. Contribution to GDP is based on value added, nominal.
5. Determined based on 25 percent weightage to each of the four factors and ability to influence in scaling SMEs.

Source: IHS Markit database; India's turning point, McKinsey Global Institute, August 2020, press search

Empowering India's next generation of talent

One of the key ingredients for accelerating India's path to broad-based and inclusive growth is having the right talent. Without sufficient opportunities to gain employable skills — especially in high-demand areas — India's growing workforce will neither be able to climb the socioeconomic ladder nor fuel the country's growth.

With a primary focus on key sectors — banking, capital markets, manufacturing, IT services, healthcare, and transport — India Inc. could help create a workforce for the future across three dimensions:

1. **Strengthen foundational skills in key sectors by:**
   - **Partnering with the government to modernise the curriculum** in schools and colleges. An instructive example of such a partnership is Microsoft's memorandum of understanding with the Sikkim government to impart technology skills in schools. A concerted and combined effort to train and upskill the workforce in key sectors would better prepare future generations for successful careers, positioning India to become a prosperous high-income country.
   - **Improving access to learning** to enable last-mile education. Companies could partner with edtech players to develop low- or no-cost training programmes, delivered via smartphones and digital tablets.
   - **Creating specialisation opportunities** in partnership with the government to offer vocational training and internship programmes to help young people develop niche or high-demand skills.
2. **Spearhead skilling and reskilling initiatives in high-growth domains by:**
   - **Partnering with academic institutions and the government** to scale skilling efforts and develop standard certification programmes across job roles. For example, NASSCOM partnered with the Ministry of Electronics and Information Technology to launch FutureSkills, which seeks to build more than 155 skills across emerging technologies for over 70 job roles.[232] The programme aims to upskill or reskill more than 400,000 IT employees by 2025.
   - **Scaling up existing digital and physical training infrastructure.** Industry bodies could develop and enhance model factories, software-as-a-service (SaaS) centres, and Industry 4.0 institutes, and augment these with real-world projects and sandbox environments. For micro, small, and medium enterprises, the industry could launch a training academy and leverage the government's Assistance to Training Institutions Scheme, which aims to support entrepreneurship and skill development programmes.
   - **Upgrading in-house company training** product management, SaaS models, AI and machine learning, software-defined wide area networks, telehealth, Industry 4.0, Internet of Things adoption, analytics, blockchain, augmented reality, and virtual reality. Several companies already run such programmes, to upskill their employees on the latest technologies.
3. **Modernise learning delivery methods and prepare for the future of work in high-potential sectors by:**
   - **Promoting a three-way partnership to develop modern curricula.** Universities, industry stakeholders, and companies in the edtech sector could work together to embed content on in-demand skills into the curricula and apprenticeships. Simulation and gamified or live projects could be adopted to drive greater engagement and learning outcomes. This could help double the deployable tech talent, from 2.5 million currently to between 5.5 million and 6.5 million by 2030.[233]
   - **Expanding the scope of the existing skill council** to include green jobs. Industry bodies could train new talent in operations and maintenance of renewable-energy technologies by introducing certification programmes on green manufacturing, for example.

[232] "Private sector must act as the early warning system- as training, financial and employment stakeholder: MoS IT Shri Rajeev Chandrasekhar", Press Information Bureau, Oct, 2021.
[233] NASSCOM-India's Tech Industry Talent: Demand Supply Analysis (February 2022).

India – the preferred destination for global capital

To unlock greater productivity and accelerate growth across the ten priority sectors, India will need affordable funding. Currently, Indian enterprises receive 68 percent of their money from banks, more than double the share for US-based enterprises.[234] To reduce this dependence on domestic capital, India must attract greater foreign capital inflows into its markets.

India could plan to increase its share of private investments in the Asia-Pacific region to 30–35 percent from about 20 percent.[235] It could also deepen its capital issuance as a share of GDP to 20 percent, from 6–8 percent, and grow its foreign investment stock, as a percentage of GDP, to 70–75 percent from 45–50 percent.[236]

To promote the inflow of foreign capital, India would need to deepen its capital markets, create an enabling environment for businesses to flourish, and improve contract reinforcement. The following steps could be considered:

- **Widen products and services focused on international investors.** All stakeholders could come together to undertake the following measures for deepening India's capital market:
  - **Diversify portfolio of offerings:** To cater to a variety of risk profiles and augment offerings to foreign investors, companies in the financial sector could diversify their portfolios by adding new, innovative products such as high-rated environmental, social, and governance (ESG) securities, international securities, low-volatility fixed-income products, and high-risk, high-return products (such as long-short equity and distressed assets).
  - **Include India in global bond indices:** Policymakers could facilitate Indias entry into global bond indices by reducing the foreign ownership cap on government bonds and exempting foreign buyers from capital gains tax, which could potentially unlock foreign portfolio investments of about $40 billion for the country.[237]
  - **Monetisation of real estate:** Companies could help with the monetisation of brownfield assets using investment and real estate trusts, for example, and trade more real asset-based instruments on exchanges.
  - **Promote ESG products:** Financial services companies and policymakers could partner to promote ESG products by creating an ESG league table, strengthening ESG reporting, ascribing a lower risk to ESG products, and offering tax breaks and waivers.
  - **Enable companies to raise funds in foreign currency:** Industry bodies could guide unicorns, start-ups, and unlisted companies to raise funds via Gujarat International Finance Tec City International Financial Service Centre exchange, which permits raising funds in foreign currencies.[238]
- **Create avenues to access capital for micro, small, and medium enterprises (MSMEs):** Industry bodies and policymakers could help MSMEs raise capital by formalising the credit rating system, organising training programmes on pitching to foreign investors, creating a unified platform to connect with foreign investors, and more.
- **Shape a conducive business environment.** The government, with support from industry bodies, could collaborate on the following measures to facilitate an enabling environment for private enterprises:
  - **Digitise and simplify compliance processes:** The use of the Business Reforms Action Plan and Know Your Customer processes could be prioritised. The use of e-signatures and other innovative digital tools could also be formalised to help Indian companies enter technology joint ventures with global manufacturers.
  - **Create a one-stop shop for approvals and compliances:** Process improvements that enable businesses to submit documents only once for all government processes across states would improve the ease of doing business in India. Other enabling measures could include setting up e-governance for businesses at the state level, scaling up single e-window facilities to address industry queries, and accelerating the implementation of new land reforms.

234 CGFS Papers: Structural changes in banking after crisis, Bank of International Settlements, 2018.
235 AVCJ Research; Venture Intelligence, VCCEdge.
236 Dealogic; Prequin; World Bank; EIU; UNCTAD (Foreign Direct Investment Stock); IMF (Portfolio Liabilities Stock); World Bank (GDP).
237 HSBC Analyst Report.
238 For more, see GIFT Special Economic Zone (SEZ), Gujrat International FinanceTec-City.

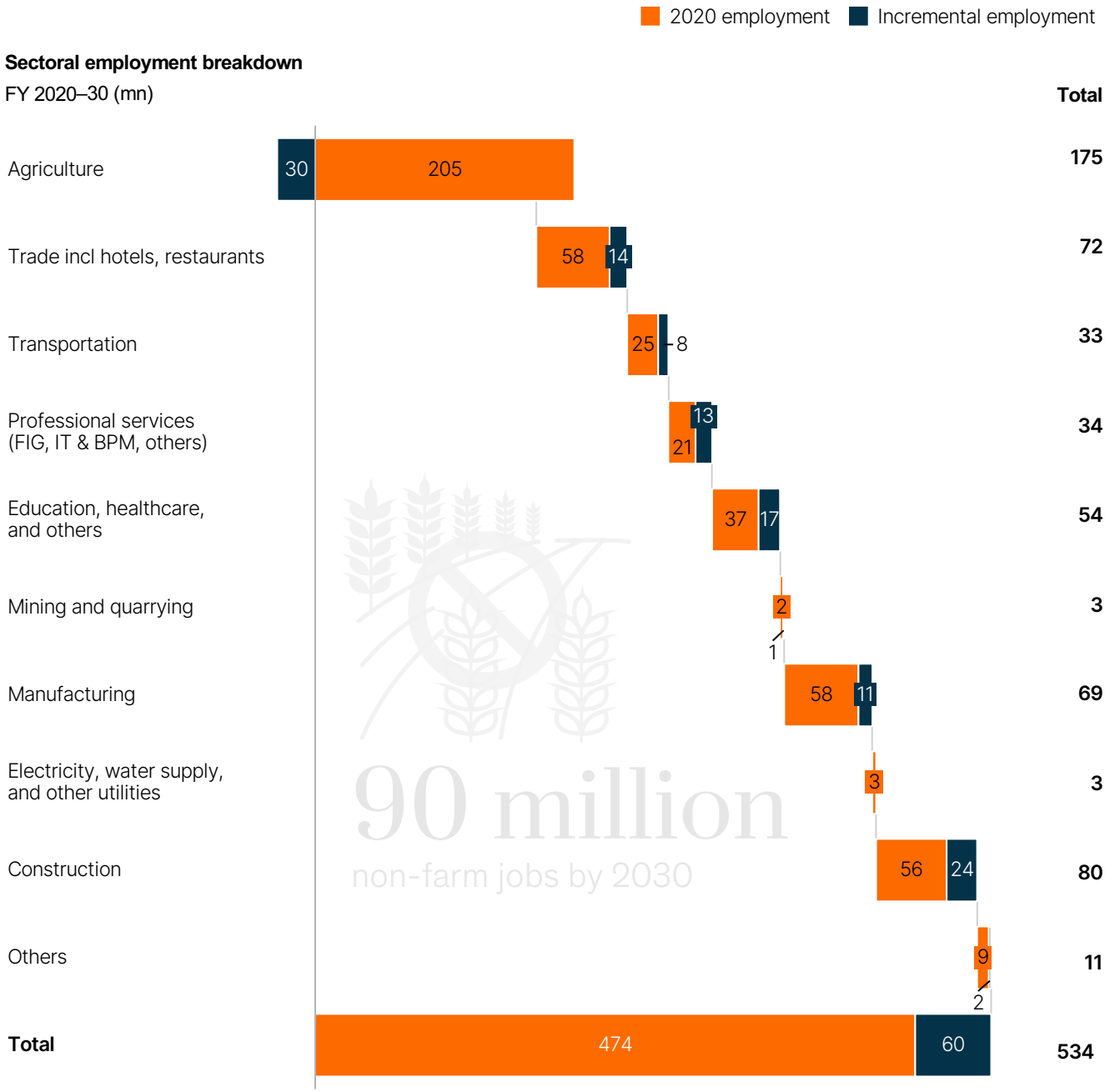
- **Streamline contract enforcement and dispute resolution.** India's law-enforcement system can be a barrier for increased inflow of global capital. To address it, consideration could be given to a number of options:
  - **Increase judicial capacity:** Considering India has only 20 judges per 1 million people, five times less than the United States, boosting capacity would drastically reduce resolution times.[239]
  - **Specialized courts for intellectual property protection:** Countries such as Japan and China have strengthened intellectual property protection and enforcement by establishing specialized courts to help plug gaps due to the shortage of judicial resources.
  - **Strengthen enforcement of insolvency and bankruptcy laws:** Create more dispute resolution professionals, expand on budgetary allocations to upskill insolvency professionals, improve tribunal infrastructure, and digitise the insolvency resolution process.
- **Rationalise investment costs:** The government could support foreign investors by simplifying tax structures across states, offering tax rationalisation, ensuring capital gains tax parity between equity and debt products, reducing withholding tax, and more. It could also enable foreign investors to hedge their long-term investments by creating investment options beyond the basic financial instruments and introducing policies to safeguard investments from the risk of sudden and sharp currency movements.
- **Make reporting more transparent:** The government could create a unified platform to access historical financial records of companies from government databases using digital technologies and analytics. Artificial intelligence and machine learning for data analytics can also be used to project companies' financials based on past performance, create application programming software to enable real-time reporting, and harmonise ESG rating methodologies and increase ESG disclosure quality.

[239] "India has about 21 judges per million people", Economic Times, February 2022

Appendix

Exhibit 24

India has the potential to create around 90 million non-farm jobs by 2030.

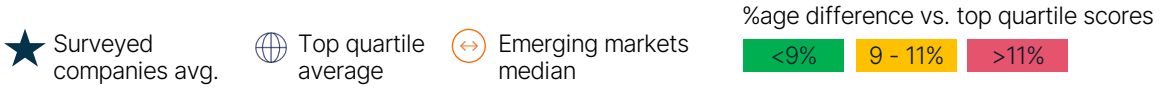


Source: "Periodic labor force survey 2017–18, ILOSTAT; "National accounts statistics 2020," Ministry of Statistics and Programme Implementation, Government of India; McKinsey Global Institute analysis

Exhibit 25

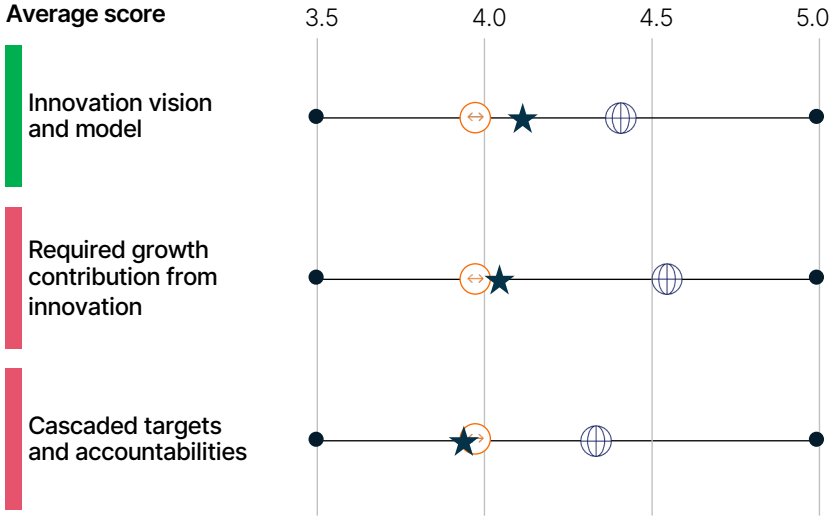
Aspire

Performance by critical capability > Aspire



Score on critical capabilities

Average score compared to top performing companies in the global database; N=130



Practices of top innovators

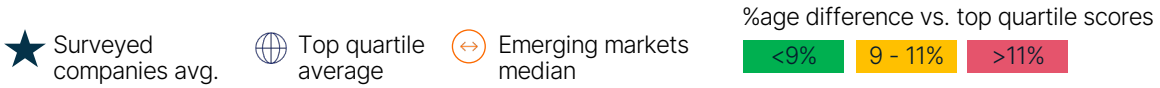
Surveyed companies emphasise the importance of innovation to their mission and strategy from the very top of the organisation. To realise their innovation aspirations consistently, they could:

- Use quantitative target financial metrics and non-financial metrics
- Identify gap between planned growth targets and expected growth from traditional levers and outlining this as the "green box" to be fulfilled through innovation
- Cascade overall innovation-driven growth targets into relevant operating units

Source: Federation of Indian Chambers of Commerce and Industry (FICCI) companies, McKinsey Innovation Quotient;
All respondents N=130

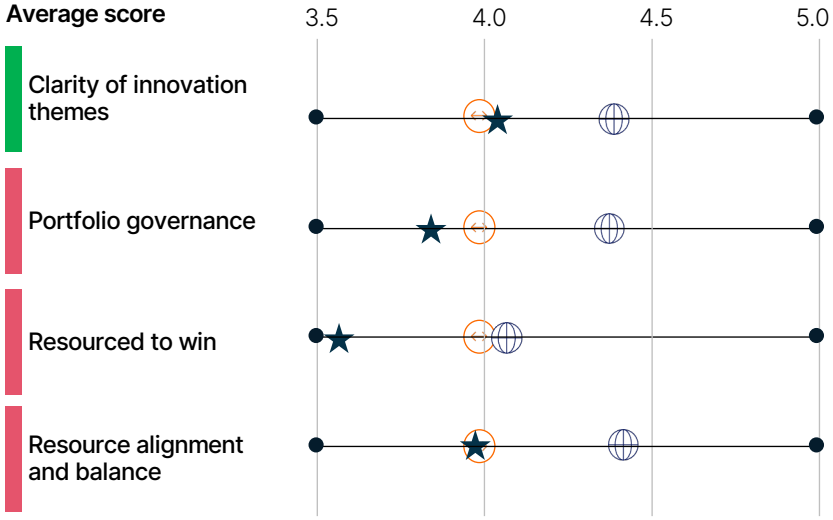
Exhibit 26

Choose



Score on critical capabilities

Average score compared to top performing companies in the global database; N=130



Practices of top innovators

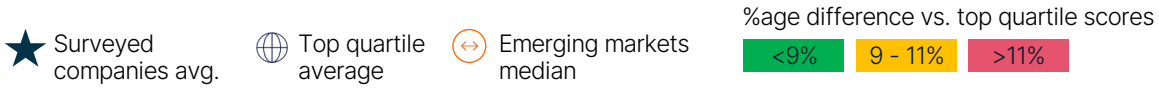
Surveyed companies have strong selection mechanisms for innovation themes best aligned with their company strategy. They could:

- Institute an innovation governance office, reporting directly to CTO/CSO to oversee the company's innovation portfolio
- Identify a minimum target for investment in "big bets" outside of core business
- Assign protected, "ringfenced" budgets to P&L owners, innovation projects to support early-stage experimentation

Source: Federation of Indian Chambers of Commerce and Industry (FICCI) companies, McKinsey Innovation Quotient; All respondents N=130

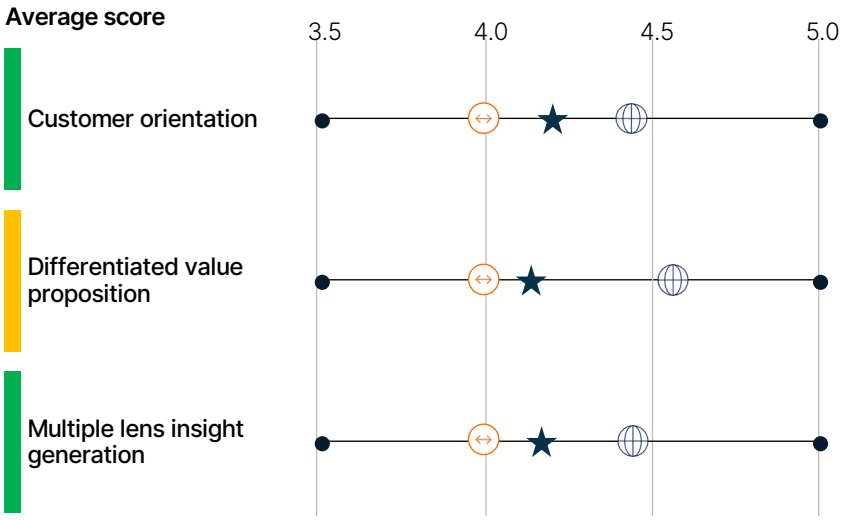
Exhibit 27

Discover



Score on critical capabilities

Average score compared to top performing companies in the global database; N=130



Practices of top innovators

Surveyed companies could generate ideas for developing products and offerings that address evolving, unmet consumer needs through the proliferation of these practices:

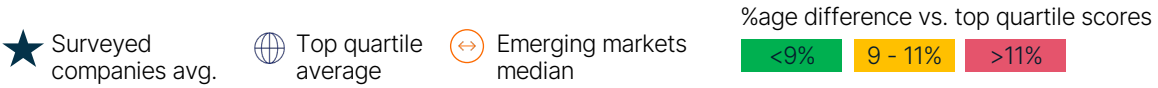
- Mandate P&L owners to dedicate resources to consumer experience assessment
- Assign dedicated resources to functional departments to keep abreast of consumer trends to inform product development
- Establishing periodic, company-wide forums to review
- Instituting systems to scan for evolving trends in product categories and global geographies

Source: Federation of Indian Chambers of Commerce and Industry (FICCI) companies, McKinsey Innovation Quotient; All respondents N=130

Exhibit 28

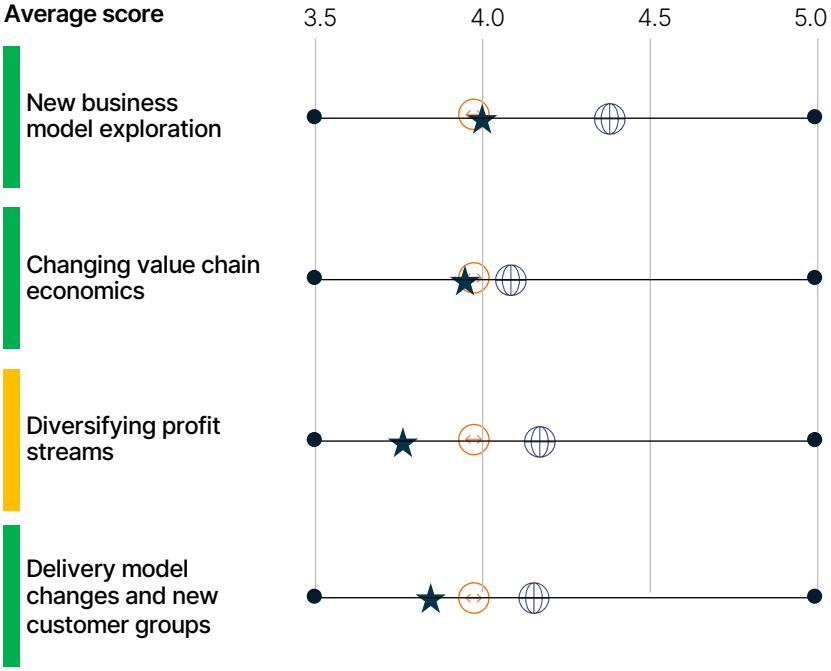
Evolve

Performance by critical capability > Aspire



Score on critical capabilities

Average score compared to top performing companies in the global database; N=130



Practices of top innovators

Surveyed companies are relatively commensurate with top quartile performers from global and emerging markets and specialise in collecting market intelligence to adapt to the world's largest consumer markets.

The following practices can help companies strengthen their capability to adapt to market requirements:

- Rigorously track customer engagement KPIs (e.g., sales mix across geographies and multiple distribution channels) to recognise need for re-confirming core assumptions about the company's business model
- Validate business models using advanced analytical techniques to de-risk projects involving business model shifts

Source: Federation of Indian Chambers of Commerce and Industry (FICCI) companies, McKinsey Innovation Quotient; All respondents N=130

Exhibit 29

Performance by critical capability > Aspire

Accelerate

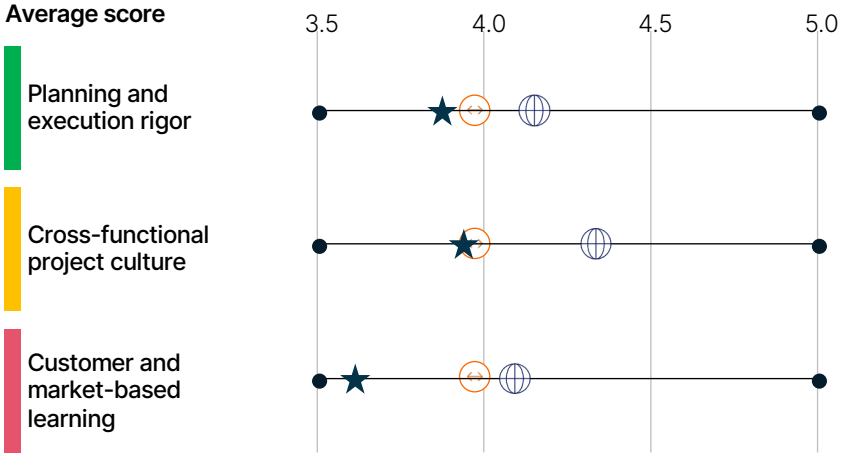
Surveyed companies avg. | Top quartile average | Emerging markets median

%age difference vs. top quartile scores: <9% | 9 - 11% | >11%

Score on critical capabilities

Average score compared to top performing companies in the global database; N=130

Average score



Practices of top innovators

Surveyed companies place strong focus on building comprehensive launch plans that are cost-effective and quality conscious. Practices to follow:

- Create a central innovation project management office
- Adopt agile techniques for rapid, iterative prototyping of new products by cross-functional teams
- Assign end-to-end P&L ownership to innovation project leads, with authority over staffing decisions

Source: Federation of Indian Chambers of Commerce and Industry (FICCI) companies, McKinsey Innovation Quotient; All respondents N=130

Exhibit 30

Performance by critical capability > Aspire

Scale

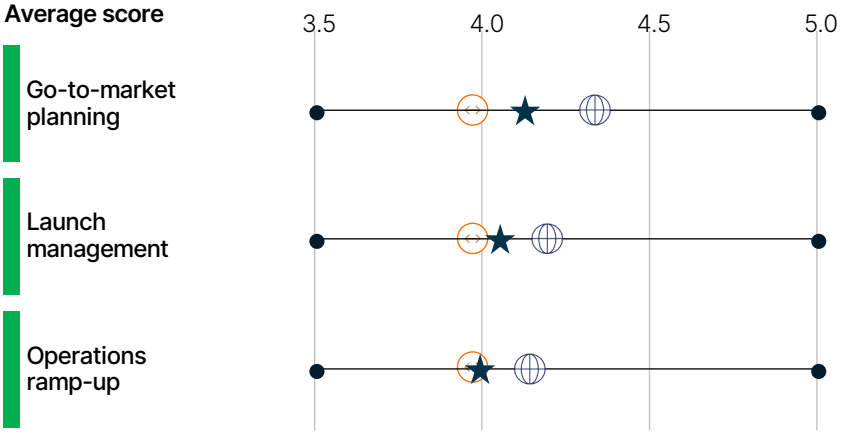
Surveyed companies avg. | Top quartile average | Emerging markets median

%age difference vs. top quartile scores: <9% | 9 - 11% | >11%

Score on critical capabilities

Average score compared to top performing companies in the global database; N=130

Average score



Practices of top innovators

Surveyed companies display strong capabilities to rapidly scale "proven" new products and services across global markets. A few practices which have enabled this are:

- Involvement of sales/marketing and operations functions early in the development process
- Standardise structured hierarchies for large-scale global roll-out
- Phased roll-out of new products through launch pilots

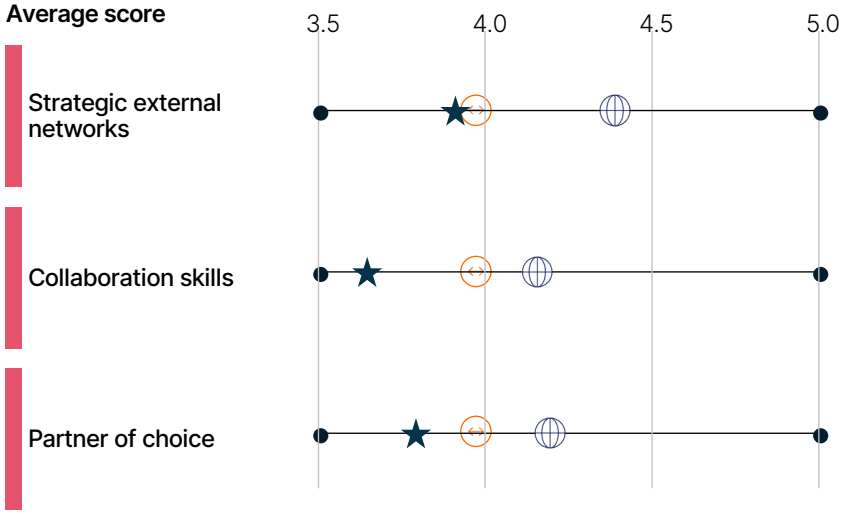
Source: Federation of Indian Chambers of Commerce and Industry (FICCI) companies, McKinsey Innovation Quotient; All respondents N=130

Exhibit 31

Extend

Score on critical capabilities

Average score compared to top performing companies in the global database; N=130



Practices of top innovators

Surveyed companies lag significantly behind to source new ideas. They could significantly boost their engagements with external stakeholders to obtain new ideas with commercial potential through both organic and inorganic means. This could involve:

- Deepening their networks of external collaborators
- Establishing governance mechanisms for external collaborations
- Continued engagement through formal and informal partnerships

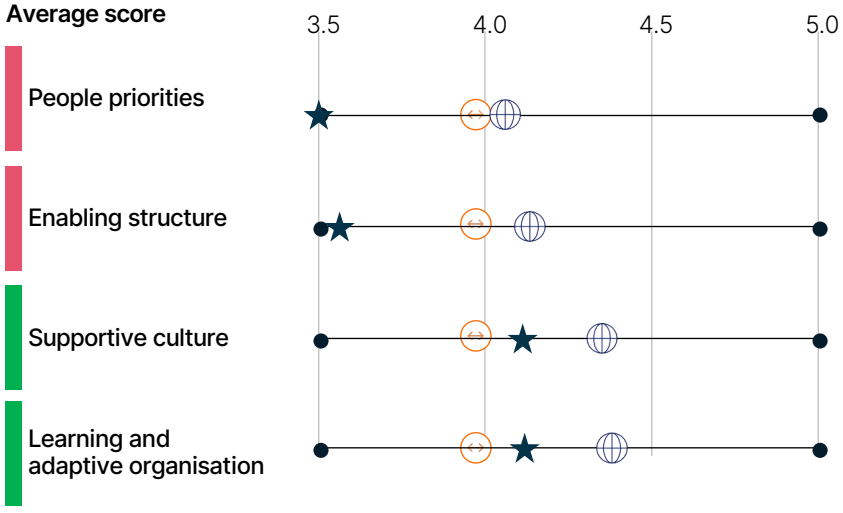
Source: Federation of Indian Chambers of Commerce and Industry (FICCI) companies, McKinsey Innovation Quotient; All respondents N=130

Exhibit 32

Mobilize

Score on critical capabilities

Average score compared to top performing companies in the global database; N=130



Practices of top innovators

Surveyed companies tend to have leadership that actively encourages innovation and the free flow of ideas within their organizations. They could engage multiple levers to further capitalise on the intellectual prowess of their employees, such as:

- Introducing financial and non-financial incentives
- Formal organisational structures to streamline innovation pipelines

Source: Federation of Indian Chambers of Commerce and Industry (FICCI) companies, McKinsey Innovation Quotient; All respondents N=130

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Acronym glossary

AA	Account Aggregator
ABDM	Ayushman Bharat Digital Mission
Agtech	Agricultural Technology or Agrotechnology
AI	Artificial Intelligence
AMFI	Association of Mutual Funds in India
AMFI	Alliance for Water Stewardship
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
ANMs	Auxiliary Nurse Midwives
APAC	Asia-Pacific
APEDA	Agricultural and Processed Food Products Export Development Authority
APIs	Application Programming Interfaces
AR	Augmented Reality
AREAS	Association of Renewable Energy Agencies of States
ASEAN	Association of SouthEast Asian Nations
ASHAs	Associated Schools of Health Sciences
AWE	Alkaline Water Electrolysis
AWS	Auxilliary Nurse Midwives
B2C	Business-to-consumer
BESS	Battery Energy Storage System
BIM	Building Information Modelling
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
BOCW	Building & Other Construction Workers
BRAP	Business Reforms Action Plan
BRICS	Brazil, Russia, India, China and South Africa
BU	Billion Units
CBSE	Central Board of Secondary Education
CCGT	Combined Cycle Gas Turbine
CCUS	Carbon Capture, Usage and Storage
CDMO	Contract Development and Manufacturing Organization
CERSAI	Central Registry of Securitisation Asset Reconstruction and Security Interest
CES	Consumer Electronics Summit
CFC	Common Facility Centre
CGTMSE	Credit Guarantee Fund Trust for Micro and Small Enterprises
CHCs	Community Health Centers
CIS	Commonwealth of Independent States
CISCO	Combined Cycle Gas Turbine
CKYC	Central Know Your Customers
CO2	Carbon Dioxide
CRAMS	Contract Research and Manufacturing Services
CREDAI	Confederation of Real Estate Developers' Associations of India
CSO	Central Statistics Office
CSTIs	Construction Skills Training Institutes
CTO	Chief Technology Officer
CX	Customer Experience
DALY	Disease Adjusted Life Years
DARPA	Defense Advanced Research Projects Agency
DEPA	Data Empowerment and Protection Architecture
DNB	Diplomate of National Board
DoD	Department of Defence
DRG	Diagnosis-Related Group
DRPs	Dispute Resolution Professionals
e2e	End-to-End
ECLGS	Emergency Credit Line Guarantee Scheme
EESL	Energy Efficiency Services Limited
EFCs	Export Facilitation Centers
HER	Electronic Health Record
EIC	Export Inspection Council
EMA	European Medicines Agency
EQUIS	European Quality Improvement System
ERP	Enterprise Resource Planning
Evs	Electric Vehicles
EWS	Early Warning Signals
FASTag	Electronic toll collection system in India
FDA	Food and Drug Administration
FHIR	Fast Healthcare Interoperability Resources
FI	Financial Inclusion
FICCI	Federation of Indian Chambers of Commerce and Industry
FiTs	Feed-in-Tarrifs
FMCG	Fast-moving Consumer Goods
FPI	Foreign Portfolio Investments
FPOs	Farmer Producer Organisation
FSSAI	Food Safety and Standards Authority of India
FY20/FY30	Financial Year 2020/ 2030
G-20	Group of Twenty is an intergovernmental forum comprising 19 countries and the European Union
G-6	Group of Six (G6) was an unofficial forum which brought together the heads of the richest industrialized countries France, West Germany, Italy, Japan, the United Kingdom and the United States.
GDP	Gross Domestic Product
GeM	Government e Marketplace (or e-Marketplace)
GER	Gross Enrolment Ratio
GHG	Greenhouse Gas
GIFT	Gujarat International Finance tec-city
GST	Goods and Services Tax
GSTIN	Goods and Services Tax Identification Number
GSTN	Goods and Services Tax Network
GW	Gigawatt
HAM	Hybrid annuity model
HAQ	Healthcare Access and Quality
H-CNG	Hydrogen Compressed natural gas
HIPAA	Health Insurance Portability and Accountability Act
HLEG	High Level Expert Group
IARI	Indian Agricultural Research Institute
ICAR	Indian Council of Agricultural Research
ID	Infrastructure Development
IFSC	India Financial System Code
IH2A	India Hydrogen Alliance
INDC	Intended Nationally Determined Contribution
InvITs	Infrastructure Investment Trust
IoT	Internet of Things
IP	Intellectual Property
IPOs	Initial Public Offers
IQ	Innovation Quotient
IRDAI	Insurance Regulatory & Development Authority of India

IREDA	Indian Renewable Energy Development Agency Limited
ISRO	Indian Space Research Organization
ISTS	Inter State Transmission System
IT	Information Technology
ITES	Information Technology Enabled Services
JAC	Jharkhand Academic Council
JVs	Joint Ventures
KSDC	Karnataka State Dental Council
KUIDFC	Karnataka Urban Infrastructure Development and Finance Corporation
KVK	Krishi Vigyan Kendra
KYC	Know Your Customers
LDES	Long-duration Energy Storage
LFPR	Labor Force Participation Rate
LMS	Learning Management Systems
LPI	Logistics Performance Index
M&A	Mergers and Acquisitions
MBBS	Bachelor of Medicine, Bachelor of Surgery
MCI	Medical Council of India
MeitY	Ministry of Electronics and Information Technology
ML	Machine Learning
MMLPs	Multi-Modal Logistics Parks
MNRE	Ministry of New and Renewable Energy
MoF	Ministry of Finance
MoHFW	Ministry of Health and Family Welfare
MoP	Ministry of Power
MPEDA	Marine Products Export Development Authority
MPHWs	Multipurpose Health Workers
MRA	Mutual Recognition Agreements
MSE-CDP	Micro and Small Enterprises Cluster Development Programme
MSME	Micro, Small and Medium Enterprises
MTPA	Million Tonnes per Annum
MUDRA	Micro Units Development & Refinance Agency
MUINFRA	Maharashtra Urban Infrastructure Development Company NABARD National Bank for Agriculture and Rural Development
NABFID	National Bank for Financing Infrastructure and Development
NABH	National Accreditation Board for Hospitals & Healthcare Providers
NASSCOM	National Association of Software and Services Companies
NBFCs	Non-Banking Financial Companies
NBFPO	National Board for Farmer Producer Organisation
NCERT	National Council of Educational Research and Training
NCGTC	National Credit Guarantee Trustee Company
NeML	NCDEX e Markets Limited
NEP	National Education Policy
NHAI	National Highway Authority of India
NIIF	National Investment and Infrastructure Fund
NIPUN	National Initiative for Proficiency in Reading with University and Numeracy
NISE	National Institute of Solar Energy
NITI	National Institution for Transforming India
NPA	Non-Performing Asset
NPCI	National Payments Corporation of India
NRCs	National Resource Centers
NSDC	National Skill Development Corporation
NSEFI	National Solar Energy Federation of India
NSQF	National Skills Qualifications Framework
O&M	Operations and Management
OCEN	Open Credit Enablement Network
ODOP	One District One Product
OECD	Organisation for Economic Co-operation and Development
ONDC	Open Network for Digital Commerce
OPD	Outpatient Department
O-RAN	Open Radio access network
OSDA	Odisha Skill Development Authority
PE	Private Equity
PEM	Proton Exchange Membrane
PF	Provident Fund
PG	Postgraduate
PHI	Patient Health Information
PLI	Production Linked Incentive
PMAY	Pradhan Mantri Awas Yojna
PM-JAY	Pradhan Mantri Jan Arogya Yojana
PMKSY	Pradhan Mantri Krishi Sinchayee Yojana
PMKVY	Pradhan Mantri Kaushal Vikas Yojana
PPP	Public–Private Partnership
PPs	Power plants
R&D	Research and Design
RBI	Reserve Bank of India
RE	Renewable Energy
REIT	Real Estate Investment Trust
RERA	Real Estate Regulatory Authority
RPL	Recognition of Prior Learning
RTC	Round-the-Clock
RTP	Real Time Payments
SAARC	South Asian Association for Regional Cooperation
SaaS	Software as a Service
SCPD	Stanford Center for Professional Development
SD WAN	Software-defined Wide Area Network
SEBI	Securities and Exchange Board of India
SECI	Solar Energy Corporation of India
SEZ	Specific Economic Zones
SKU	Stock Keeping Unit
SLCM	Sohan Lal Community Management
SMEs	Small and Medium Enterprises
SOEC	Solid Oxide Electrolysis Cell
SPVs	Special Purpose Vehicles
SQAA	School Quality Assessment & Assurance
SXSW	South By Southwest
Tn	Tonne
TPA	Tonnes Per Annum
TRAI	Telecom Regulatory Authority of India
TReDS	Trade Receivables Discounting System
UAV	Unmanned Aerial Vehicle
UG	Undergraduate
UGC	University Grants Commission
UI	User Interface
ULBs	Urban Local Bodies
ULIP	Unit Linked Insurance Plan
UP	Uttar Pradesh
UPI	Unified Payments Interface
UPNEDA	Uttar Pradesh New and Renewable Energy Development Agency
US	United States
UX	User Experience
VC	Venture Capital
VGF	Viability Gap Funding
VR	Virtual Reality
WEF	World Economic Forum
WH	Warehouse
ZLD	Zero-Liquid Discharge

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