



The Digital Dominance Catalysing India's rise as a global digital leader

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Foreword - CII

India is taking its flourishing digital economy to new heights. The Government is poised to accelerate India's journey to digitisation in the ongoing techade and achieve a range of milestones, creating new opportunities to maximize the potential of India's demographic dividend.

Currently, digitisation is playing an important role in improving access to public services, digital applications and knowledge resources, and this role will only grow in the future. The Government's 'Digital India' initiative is working towards this goal and has made notable strides in narrowing the digital divide between rural and urban India. Technology is the key leveller that is building a more inclusive society and empowering citizens – future-facing technologies such as 6G, open-source datasets, quantum computing, and AI powered ecosystems will undoubtedly buttress this goal.

Moreover, as this white paper notes, the adoption of innovative technologies in different sectors like healthcare, education, and agriculture will help these markets grow, increase the quality of offerings, and help deliver more efficient and effective solutions. For instance, innovation in healthcare technology such as sensors and AI will augment early detection of disease and preventive care. Similarly, a digital overhaul of education will improve interactive lessons, and technologies like learning analytics will do the same for student outcomes and facilitate better decision making. The Government is also tackling the task of feeding India's growing population amidst climate uncertainties. Investing in agri-tech innovation will lead to an increase in productivity and sustainability, and, more importantly, improve returns for farmers.

The launch of next-gen communication technologies like 5G, and the gradual transition to technologies like 6G and satellite networks will have positive effects such as reducing energy consumption and improved broadband connectivity. These developments will also bolster the sharing of online content and lead to a greater rise of the creator economy (which has generated both jobs and revenues in hitherto untapped areas), and which Meta is also proud to have contributed to, through its platforms.

New technologies aside, rethinking old systems like manufacturing will allow India to reap the benefit of economies of scale and integrate into the global value chain. In the initial stage, as the white paper notes, technologies like robotics and automation will help reduce errors and costs in the delivery of products, and technologies like the Metaverse and AR/VR will provide immersive and interactive experiences that can equip workers with new skills and create safer (and more efficient) working environments. As part of this, Meta has invested in the development of AR/VR products – which we believe to be the future of digital connection – and whose long-term value stands to be realised from the way developers and creators use such products.

It would be remiss not to make mention of India's success story with UPI. UPI has resulted in a digital financial revolution for the country – a revolution Meta has also been part of through WhatsApp Pay. Akin to UPI, the ONDC is another example of a unique home-grown digital product. The vast potential of the ONDC initiative is indicative of India's rising prowess in the e-commerce sector. Meta is, once again, proud to have contributed to the growth of e-commerce in India through products such as WhatsApp for Business, that have encouraged small and medium businesses to go digital.

Separately, setting the stage for the future, technologies such as predictive analytics, generative AI, and quantum computing will finally bring about the 6th industrial revolution. As India accelerates its integration into the global value chain, each of the above-mentioned initiatives mentioned will undoubtedly aid in this mission. Meta is also committed to investing in future-first technologies like next-gen AI that will require powerful new computers. In preparation, Meta has designed and built the AI Research SuperCluster, one of the fastest AI supercomputers today, with the aim of creating foundational technologies (such as large language models) that will power the Metaverse and advance the broader AI community.

Lastly, as India positions itself to become a significant player in the global semiconductor market, the Government can capitalize on the limited number of players currently in the market, and use as opportunities the vulnerabilities that create global uncertainties, like economic stand-stills. While India has a long journey before it becomes self-reliant in semiconductors, investments in AI and automation will contribute to more innovation in the semiconductor industry. Moreover, as developments in AI technologies create demand for powerful and scalable computing capabilities and massive storage and computing resources, they will not only create a boom of cloud services and data centres but will also generate millions of employment opportunities.

Where India was once underestimated as being a destination for the BPO industry due to cost savings, it is now rightfully taking its place as a leader in offering critical digital and technological solutions across different sectors. With its unyielding, visionary focus on revolutionizing the digital ecosystem, the India of today is cementing its position as an emerging digital economy – and Meta, like the wider technology sector, will continue to be an ally in this journey.

Ms. Sandhya Devanathan

Chairperson, National Digital Summit and Vice President, Meta India

Foreword - Deloitte

The “digital” wave hit India for good and today, digitisation extends far beyond a technological transformation. It is evidently unfolding our country’s future and bringing in affordability, security, and accessibility for goods and services. Digital has brought in transparency, competitiveness across the globe, and a broader sense of societal well-being – both for consumers and corporate India. It has also opened up new avenues for international trade and sustainability; created new business and job opportunities; and ultimately brought in economic efficiency for a nation.

As India moved swiftly to become the fifth-largest economy, digital penetration efforts now play an even larger role given the large population spread across multiple terrains and economic strata.

A child living in a remote village in Rajasthan deserves the same quality of education that his peers in Delhi receive. A small and medium businessman deserves profitability and hassle-free commerce through a swift, secure, and agile supply chain.

With India’s focus on technologies such as 5G and Satcom, villages now have fast and reliable internet and telecommunication connectivity. This enabled people to make digital payments, buy goods online, stream movies, or book a doctor’s appointment from the comfort of their homes.

After the pandemic, medical professionals or human resource managers now use intellectual capital via digital communications channels at the grassroots level, bringing in the concepts of “gig economy”.

Therefore, the technology and digital boom are making citizens more aware and improving their well-being by offering services such as digital banking, healthcare, or access to talent in smaller towns – just as seamlessly as offered across metros. In short, the digital technology thread now connects India and binds it to bridge the economic islands.

The Deloitte-CII report unveils how “digital technology” is catalysing India’s rise as a global digital leader.

Through interesting use cases, the report brings interesting movements, including ONDC, 5G infrastructure, healthcare, or GCC success stories shaping up the world, with more investments, interoperability, and the ease of doing business.

Leveraging the strength of internet, India has created a plethora of digital public goods and government services that democratise the digital infrastructure. Keeping innovation at the heart of development, our nation is focused on leading by example with concepts such as UPI, a unique case study. This report shares use cases and examples to give a glimpse of the metaverse.

A prudent risk policy and regulations are crucial to protect the rights of citizens and corporations and build a resilient society. Technological developments also pose numerous risks, such as cyber-attacks or geo-political issues. Therefore, holding a nimble posture against the threats lurking in this digital world is important.

The Government of India has laid out a comprehensive plan of safeguarding measures that cover virtual interactions and user interests. For instance, the Digital Personal Data Protection Act, rolled out on 11 August 2023, frames processing digital personal data in a manner that recognises the right to safeguard personal data and the need to process such personal data for lawful purposes and development. The country also expects to usher Digital India Bill 2023 which will replace the existing Technology Act (IT Act) of 2000. This new legislation is designed to establish a comprehensive oversight over India’s digital landscape, effectively managing evolving challenges, such as deepfakes, cybercrimes, data theft, and unethical use of AI.

Read our report with an optimistic perspective, as we envision immense potential in how the future unfolds for our country.

Peeyush Vaish
Partner and TMT Industry Leader
Deloitte India

Executive summary

The year is 2035.

Vikas, a man in his 60s from a remote region of India, wakes up to a video buzz as his daughter responds to a Microsoft Teams call from her manager in Bengaluru asking her to attend to a project for their client in the United States. After his morning chores, Vikas decides to consult his doctor in Delhi about his joint pain and quickly books a virtual appointment using his mobile app. He pays the doctor's fee using digital currency after checking his account balance using his bank's digital online service.

Right then, he receives a notification on his mobile app that one of his crop fields may be experiencing an increase in pest infestation. After Vikas decides on a course of action, a message is immediately sent to the nearest pesticide supplier using an e-commerce platform, where an artificial intelligence (AI)-enabled app quickly scans the crop profile and invading pests using a drone. It then transmits real-time information using cloud-based services to the nearest pesticide factory. After additional investigation, the concerned departments place the order and deliver the appropriate pesticide directly to his field within just a few hours of Vikas being informed about the pest issue.

In the meantime, Vikas has a video consultation in which the doctor thoroughly investigates his joint problem along with his colleague in Singapore using Vikas's digital twin. Without delay, the medications prescribed by his doctors are then delivered to his home by a nearby pharmacy. In the evening, his grandson excitedly recounts his experience of seeing the planet Mars up close and discussing the possibility of life existing on the planet in a Metaverse world at his school.

Is this scenario difficult to imagine? In fact, such a scenario may not be far from a not-too-distant reality.

The rapid adoption of smartphones, an increase in the quality of Internet connectivity and the government's push towards establishing a digital economy are about to unleash tremendous opportunities and possibilities, like those described above, over the next decade. Digitisation will drive India's ambition to become a US\$ 10 trillion economy by 2035 by revolutionising finance, healthcare, education and industry. Digitisation will not only contribute to India's overall growth but also address the age-old challenges of inclusion and equity that the government has been attempting to address in recent years. Technology will be instrumental in empowering citizens, transforming the healthcare system, modernising education and enhancing the potential success of all industries and services.

In this journey of digitisation, emerging technologies, such as next-generation communications, the evolution of cloud and smart factories and India's ambition to become a semiconductor giant will be the key enablers of the country's innovation and technological transformation. Moreover, India's innovation in technology, spearheaded by the government and industry alike, will proliferate not only within its borders but also throughout the rest of the world. The need to cater to global demand, maintain a high level of quality, address sustainability concerns and bridge the skilled labour gap will drive technological integration and partnerships across borders, thereby leading to even greater innovation.

In 2035, India is going to be a very different place from what it is today. Technology will provide an advantage through which we may remain competitive while addressing skill gaps to prepare our workforce for the future.



Digitisation and public goods



Citizen empowerment

India's governance system is unmatched due to its scale, reach and scope. Strengthening democracy and enhancing governance to empower citizens has never been an easy task, but the recent extensive penetration of technology throughout all aspects of society is transforming the state-citizen relationship. Digitisation plays an important role in improving accessibility to public services, digital applications and knowledge-based resources. By 2035, it will be instrumental

in unleashing a plethora of possibilities for holistic economic and social development. Technologies will aid in inclusivity and improve trust, leading to better opportunities and meaningful participation for every citizen. It will create a world wherein individuals may express themselves via a digitally connected society. In short, digitisation will be the key to citizen empowerment.

Driving the citizen empowerment agenda is primarily the government's responsibility. It is the government that must implement and promote innovative measures to increase inclusivity and build trust.

The Indian government had a head start on implementing this agenda by ensuring that the country's digital transformation specifically benefits its citizens. The "Digital India" initiative was launched to make India a knowledge-based economy and

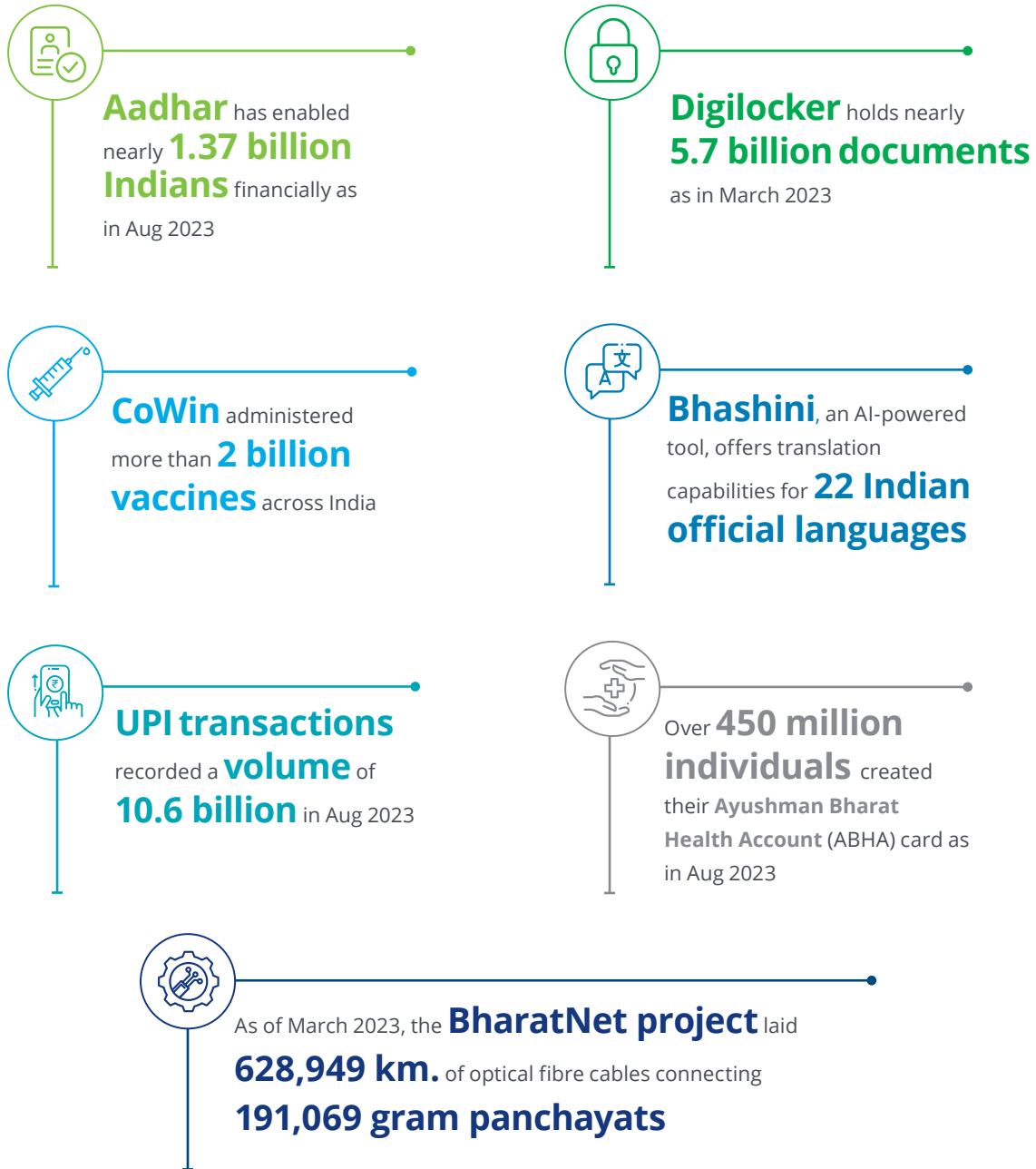
society that is empowered by new-age emerging technologies. The three main pillars upon which the "Digital India" initiative is based are listed in Figure 1.

Figure 1. Three main pillars of the "Digital India" initiative



Source: National Government Service Portal, Deloitte Research, www.MyGov.in.

Figure 2. Success of the Digital India initiative in empowering citizens using government services



Source: National Government Service Portal, Deloitte Research, www.MyGov.in.

Another effort has been minimising the digital divide.¹ Almost 65percent of India's population resided in rural areas as of 2021. In addition to ramping up the 4G infrastructure and extending it to the remotest villages, the launch of 5G technology will enable underserved areas to be brought into the mainstream.²

Most importantly, one of the government's most successful initiatives (as shown in Figure 2) is digital public infrastructure (DPI) innovation and its integration with the governance architecture to promote inclusion and build trust. Such innovation provides hassle-free digital services to citizens.

The government is now preparing for the next big leap—preparing India for a world led by AI. The vision is to “make AI in India” and “make AI work for India.”

By 2035, 6G technology, open-source datasets and an AI-powered ecosystem will be at the core of e governance. These technologies will enable digital inclusion throughout the nation and will strengthen e-governance by providing enhanced transparency and promoting increased compliance. They will also improve the efficiency of public service delivery by making digital options available.

DPI: Foundation for empowerment

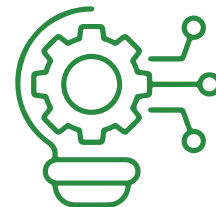
The government is deploying DPI, and India Stack is one of

the platforms that will likely further improve efficiency in transactions and public expenses, close gaps in financial inclusion, and boost government revenue collection.³ Private sector players, which are currently leveraging some of these platforms for the efficient implementation of their own services, improving their reach and identifying new opportunities for business growth, will also contribute to the development of this infrastructure and the establishment of this ecosystem. This coordinated effort will improve the reach of DPI to every corner of the nation.

Case study 1: Interoperability of digital services

The National Rural Employment Act (NREGA), which was later renamed the Mahatma Gandhi Rural Employment Act (MGNREGA), is regarded as the Indian labour law and social security measure that empowers Indian citizens by guaranteeing Indian people the “right to work.” MGNREGA was enacted in September 2005. The success of MGNREGA was driven by the collaborative implementation of digital assets by the government in the following ways:

- Aadhaar verifies the identity of MGNREGA applicants, thereby reducing fraud.
- Meghraj stores and processes data for its Direct Benefit Transfer (DBT) programme.
- The India Urban Data Exchange (IUDX) shares data between different government agencies, such as the Ministries of Health and Education.
- A Unified Payments Interface (UPI) is used to transfer wages directly to workers' bank accounts, thereby reducing the time required to process workers' pay.



DPIs have become a tool that empowers citizens in several ways, as illustrated in Figure 3.

¹<https://pib.gov.in/PressReleasePage.aspx?PRID=1894901>.

²https://www.business-standard.com/article/companies/bsnl-s-125-000-new-4g-towers-to-come-up-in-rural-hinterland-122111800813_1.html.

³<https://www.imf.org/en/Publications/WP/Issues/2023/03/31/Stacking-up-the-Benefits-Lessons-from-Indias-Digital-Journey-531692>.

Figure 3. How DPIs empower citizens



Source: Deloitte Research

Case study 2: A UPI as a tool to reach beneficiaries directly and improve financial inclusion

The Government of India is using a UPI to transfer subsidies for food, fertilisers and other essential commodities directly into the bank accounts of eligible beneficiaries. This has helped reduce leakages and ensures that benefits reach the intended recipients. Beneficiaries have also received benefits without having to travel to a government office or wait in line. Going forward, DPI will empower citizens to make their own financial decisions with a greater sense of security and will likely serve as a model for other developing nations in the years to come.



Future of healthcare

India's healthcare system is poised to be transformed into an integrated, interconnected, effective and patient-centric model by 2035. Several factors support this prediction, including rapid technological advancements, increasing government investment and growing awareness of the importance of holistic healthcare.

This shift will be facilitated by the convergence of multiple technologies, such as AI, natural language processing (NLP) and robotics, as well as innovative collaborations among diverse stakeholders across the healthcare ecosystem. These will fundamentally change the patient journey, resulting in drastically improved health outcomes and a much-enriched patient experience.

Forthcoming digital revolution in healthcare

Healthcare technology innovation and adoption in India will create new markets and establish a tremendous opportunity for healthcare providers and start-ups to expand their reach, offer new services and serve patients more efficiently. By 2035, it is predicted that the following changes will occur:





- **A shift towards preventive, predictive, and more personalised healthcare services:** The integration of modern technologies, such as NLP, will enable patients to make better choices by becoming better informed and exhibiting a preference for paths that offer seamless, transparent and frictionless care. Technologies such as sensors, genetic analysis and AI will enhance the early detection of diseases and risk factors and promote preventive care (as shown in Figure 4).
- **A transition of care delivery from hospitals to home:** Telemedicine, remote patient monitoring, home-based healthcare delivery and mobile health apps, which have been growing at a compound annual growth rate (CAGR) greater than 30 percent since the outbreak of COVID-19 in 2020, will continue to gain traction, improving access to healthcare

services, particularly in rural and historically underserved areas.⁴ The advent of Internet of Things (IoT) devices and robotics will further augment the shift of healthcare delivery from hospital to non-hospital settings, such as home. In a decade, most patient healthcare tasks in India may be performed remotely using telehealth technology rather than a traditional clinical environment; at-home advanced healthcare services may in fact become the accepted norm.

- **Less dependence on hospitals and doctors:** The collection of massive amounts of data will aid in the development of algorithms that will help develop AI- and NLP-based decision support tools for physicians. Such tools will reduce physicians' workload and mitigate doctor shortages by supporting their diagnostic tasks with evidence-based recommendations. This will enable patients to receive more prompt, accurate and personalised diagnoses and prescription recommendations remotely.
- **Advancements in highly sensitive miniaturised sensors and robotics,** combined with machine learning (ML) and artificial learning methodologies, will simplify even the most complex surgeries and significantly reduce the time required to train doctors, mitigate patient risk and improve surgical outcomes.
- **Innovative new-age interventions will improve patient outcomes throughout the patient journey in all therapeutic areas:** Technological shifts will create several opportunities for the life sciences industry to innovate and develop new products and services to enhance patient outcomes throughout all therapeutic areas and stages.

⁴<https://inc42.com/datalab/telemedicine-market-opportunity-in-indian-healthtech>.

Figure 4. Digital solutions and core technology platforms for a tech-enabled healthcare system

Category	Core technologies	Solution implementation
 Telemedicine	<ul style="list-style-type: none"> • Augmented Reality/Virtual Reality (AR/VR) • Artificial Intelligence (AI) • IoT and wearables • Chatbots 	<ul style="list-style-type: none"> • Initial virtual consultation • Health in the hands of consumers • Better experience • Real-time decisions
 Healthcare IT	<ul style="list-style-type: none"> • Software and apps • Electronic records • Big Data • App-driven diagnostics 	<ul style="list-style-type: none"> • Infrastructure supporting interaction between users and technologies • Last-mile telehealth delivery
 Treatments	<ul style="list-style-type: none"> • Robotics • 3D printing • Smart devices • Machine Learning (ML) • Nanotechnology • Synthetic artificial organs 	<ul style="list-style-type: none"> • Physical intervention tested through robots, AI, Digital Twins • Predictive analysis • Early diagnosis • Connected healthcare platform economy
 Data exchange and privacy	<ul style="list-style-type: none"> • Blockchain • IoT • AI • Open health records 	<ul style="list-style-type: none"> • Research and clinical development • Patients have access to their own data • Medication management • Data security and transparency

Source: Future-proofing healthcare report, Deloitte Research.

Case study 3: A connected healthcare system

By 2035, a patient journey like the following might well become the norm. A patient suffers a road accident and damages several internal organs and limbs. They are rushed to the Intensive Care Unit, where they are given synthetic blood transfusions until they are out of mortal danger. Instead of waiting for a compatible transplant donor, a doctor operating a semi-autonomous surgical robot implants 3D-printed organs to replace their internal organs. Their lost limbs are replaced by hybrid-assisted limbs, exoskeletons or neuro-prosthetics. They are discharged in a few days. A drone regularly delivers medicines at their home, where a suite of sensors and assistive robots monitor their recovery and help them until they learn to walk again. They regularly discuss the data recorded by these sensors with their doctor and physiotherapist, who adjust their treatment regimen as required.



The Indian government has demonstrated commitment to healthcare reforms, as evidenced by the National Health Policy, e-Sanjeevani and the ambitious Ayushman Bharat Digital Mission (ABDM). Furthermore, the National Health Portal established by the Ministry of Health and Family Welfare for Indian citizens will act as a single source for consolidated health information in the future. As healthcare providers, insurers, government agencies and technology companies work towards a unified and integrated system, seamless data exchange and collaboration will be increasingly emphasised. Enhanced interoperability will foster innovative partnerships among diverse stakeholders, allowing the development of holistic and patient-centric solutions. For example, collaborations between pharmaceutical companies, diagnostic labs and healthcare providers can streamline patient care, reduce wait times and improve treatment outcomes. Moreover, enhanced data-sharing capabilities will empower patients to take control of their health information and make informed decisions about their care.

How can global healthcare organisations grow and expand in India?

The vast potential of the Indian healthcare market, coupled with the ongoing digital transformation, presents significant opportunities for global companies looking to expand their businesses. However, to successfully penetrate this market, they must focus on localisation, collaboration and technological integration to develop value-based solutions by investing in digital healthcare platforms.

Key requirements that will enable and facilitate the implementation of these shifts in India's healthcare ecosystem:

- **Policy and regulations:** The government should create clear, consistent and business-friendly policies that encourage foreign investment in India's healthcare sector.
- **Infrastructure development:** Although its digital infrastructure is improving, further enhancement specifically in rural and remote areas is necessary to ensure the widespread reach of healthcare services.
- **Data privacy and security:** Given the sensitive nature of health-related data, the government must establish robust data protection laws to build trust between users and providers.
- **Interoperability standards:** The government should establish and enforce standards that facilitate interoperability between various healthcare technologies by encouraging seamless data exchange.
- **Education and training:** Investment in education and training programmes will ensure that healthcare providers are equipped to utilise new technologies, thereby enhancing adoption rates.

India can enhance the healthcare system for its population, which has long been deprived of optimal access to healthcare. According to Deloitte, the United States may find a vibrant new market in India to fuel the next stage of growth for its industry-leading MedTech companies.⁵

Equity in education

The entire educational system is poised to be completely transformed by modern technology. Digitally empowered classrooms using modern technology (such as augmented reality (AR)/virtual reality (VR) and AI-ML technologies) will make learning more collaborative, engaging and available to anyone who wants to learn, anytime and anywhere.

India needs low-cost and open-sourced technologies to create top-end content using non conventional delivery mechanisms to meet the educational needs of its massive youth population. Moreover, India must ensure quality education for all, upgrade existing teaching staff and improve its educational infrastructure. The National Education Programme (NEP) 2020 has set a target

of increasing the current higher education gross enrolment ratio (GER) from 27 percent to 50 percent by 2035.⁶

In this regard, technology will be a game-changer for India as it will ensure equal access to high-quality education, engaged and interactive lessons and personalised instructions to students in every corner of the country. Over the past few years, the massive

⁵<https://www2.deloitte.com/in/en/pages/about-deloitte/articles/the-future-of-health-india.html>.

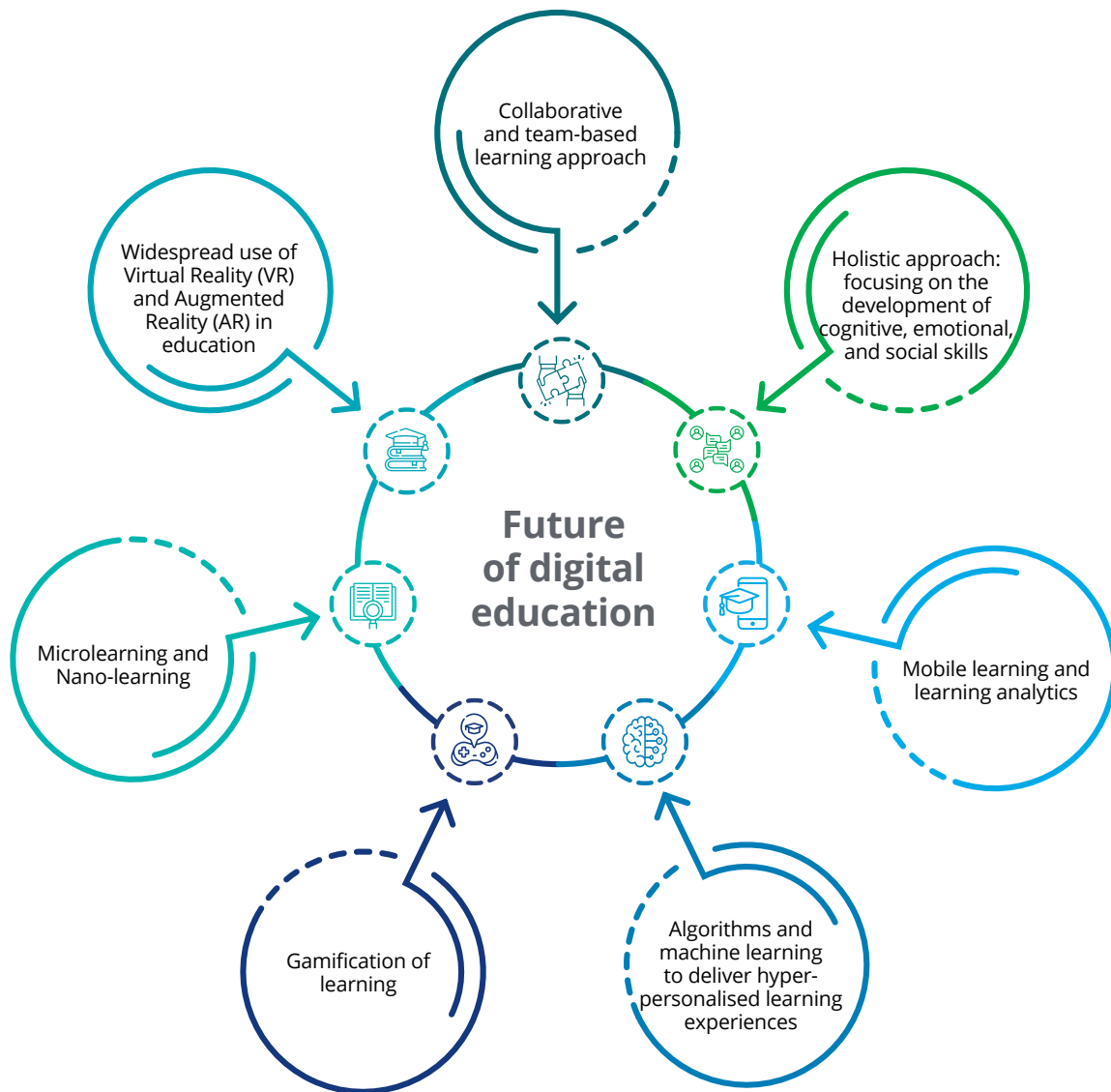
⁶<https://pib.gov.in/PressReleasePage.aspx?PRID=1642061>.

open online courses platforms have gained recognition because of their potential to reach those who are not enrolled in schools, colleges and universities. Many edtech companies are offering learning management resources, including blended learning, 3D and do-it-yourself kits and AI-based experiential and interactive learning, to provide an unrivalled experience.

As technology evolves, digital learning will offer several advantages over traditional classroom learning, including flexibility, engagement and personalisation (Figure 5). Whether

it is overlaying digital information about the real world using AR and VR or the gamification of learning to make education more interactive, digitisation will create a holistic approach for establishing a more effective and engaging learning experience in a cost-effective manner. Collaboration and team-based learning will be two important trends in digital education, thereby helping students develop the skills they require for a future-ready workforce.

Figure 5. Integration of emerging technologies across edtech platforms



Source: Deloitte Research

Learning analytics will drive improved student outcomes, more efficient use of resources and better decision-making. Algorithms will be used for customised learning materials and adaptive tests, all of which will provide students with personalised learning experiences.

Innovation in agritech

India overtook China as the world's most populated country in 2023, and the population is expected to reach 1.5 billion by 2030.⁷ Assuring sufficient food is available for such a huge population amidst climate change and global uncertainties is not going to be an easy task. India's agricultural sector must become future-ready. Agritech presents an exceptional opportunity to provide solutions that will simultaneously increase productivity and sustainability, enhance market access, improve farmers' income prospects, reduce costs and time to market and facilitate the effective implementation of government schemes.

India's agritech market is US\$ 204 million but has a significantly low market penetration of 1 percent of the overall agritech

market potential. With the penetration of technology, this sector can unleash massive opportunities for new agritech start-ups and expansion opportunities for existing ones.⁸ The government is making an effort to build an interoperable, open-source agricultural DPI for creating farmer-centric solutions and supporting the agritech industry and start-ups.⁹

Technology will transform the entire farming production cycle, from sowing to production to distribution, thereby reshaping the future of the industry. Figure 6 depicts a few digital solutions that may revolutionise every stage of farming.

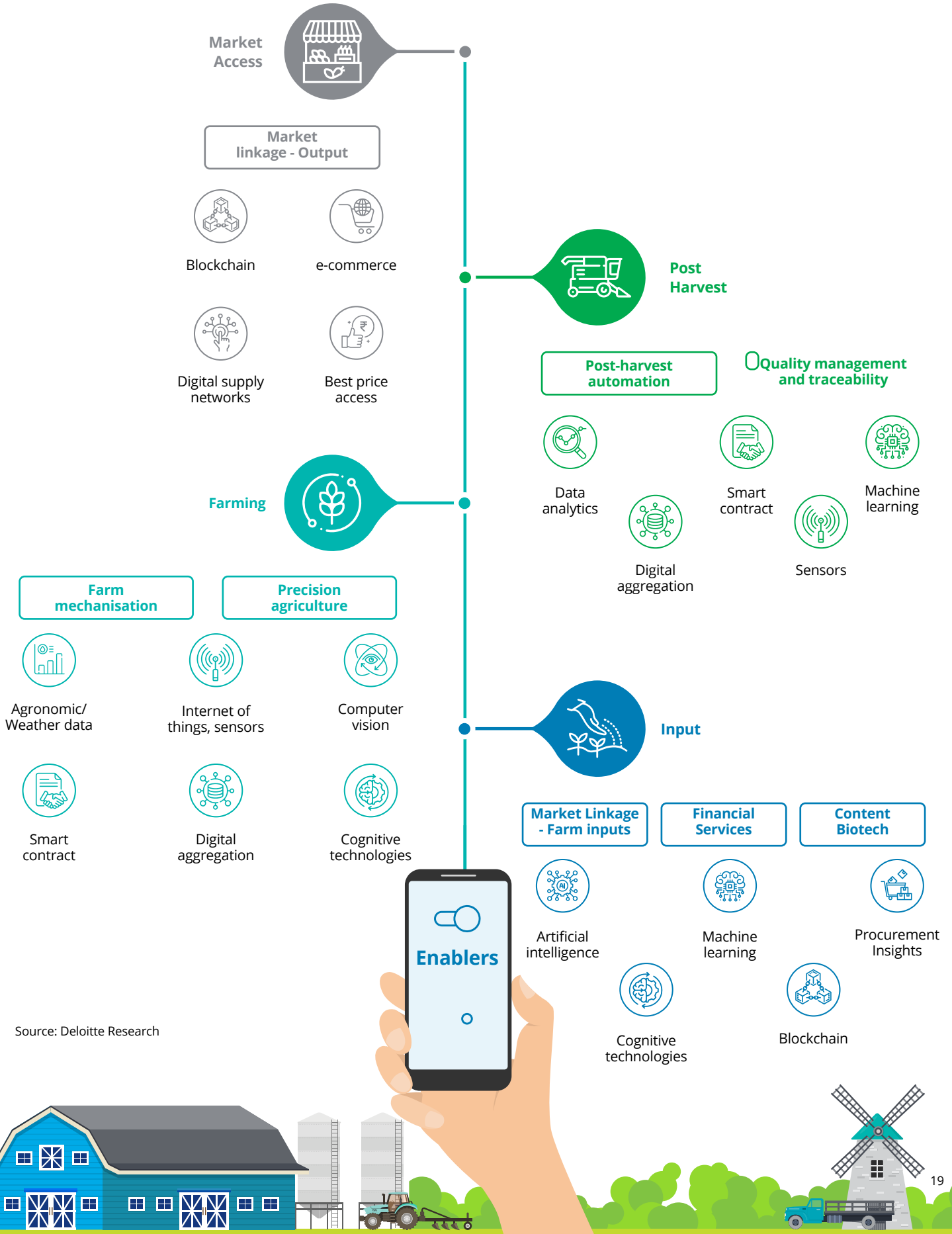
⁷<https://www.weforum.org/agenda/2022/08/world-population-countries-india-china-2030/>.

⁸https://www.niti.gov.in/sites/default/files/2023-05/Final_UNCDF_14_5.pdf.

⁹<https://www.fortuneindia.com/long-reads/the-agtech-transformation/112562>.



Figure 6. Tech-enabled agritech value chain



Source: Deloitte Research

The following characterisation summarises what agriculture may look like in the future.



Seed selection and sowing will be assisted by Artificial Intelligence of Things (AIoT) technologies. Farmers will be able to monitor resource usage and check on the health and fertility of the soil and the development of pests and illnesses in real time. Big data analysis will aid in selecting the right crops to sow and the appropriate time to harvest them, which will ultimately improve the success of a crop.



Production and evaluation of harvest will be supported by ML, IoT and cloud technology. By monitoring, analysing and evaluating agricultural output, farmers will be able to better predict output. Smart sensors will collect data that can be fed to a digital twin. With the help of digital twins, precision agriculture will yield higher-quality products at greater quantities locally, and farmers will be able to view a 3D digital recreation of an entire farm. These digital landscapes will utilise agronomic models and decision-making algorithms to determine appropriate decisions regarding crop selection and output and actions regarding water use and fertiliser access across the entire production value chain.



The post-harvest and distribution stages will be assisted by AI analytics and linked sensors, among other new technologies, providing real-time intelligence to stakeholders on how agricultural products move through value chains. The blockchain will address several challenges in the supply chain by bridging demand-supply gaps, logistics issues and weak market functioning. Digital traceability along with certification technology will enable the agroindustry to monitor products from the point of origin to the customer. ML algorithms integrated with blockchain technology will be used by farmers to predict client orders and schedule them months in advance. Customers could also make annual purchases in blocks to ensure a steady supply of farm products.



Market linkage and integrating digital mandis with the blockchain and AI will drive transparency in the supply chain. Underserved rural areas will obtain better access to fragmented services, such as decentralised exchanges of sensitive data, tamper-proof merchant repositories and operational transparency using smart contracts. Market linkages may help farmers obtain a better price for their crops, reduce risks (by providing information about market prices, weather forecasts and pest and disease outbreaks) and improve their overall income, enabling farmers to sell crops to a wider range of buyers, which could lead to higher prices and enable them to make more informed decisions.



Sustainable practices: Technology will enable farming to shift away from horizontal cultivation and move towards soilless growing methods, such as hydroponics, aquaponics and aeroponics, and in close proximity to cities. Vertical agriculture is an example of an innovative farming technique using real-time data from AIoT smart sensors that boosts food product output with limited resources. Communication technologies, such as RFIDs, QR codes and distributed ledger technology (similar to the blockchain) will be used widely to encourage transparency about the health benefits of food products and the nutritional value of farm output throughout the value chain as well as for biodiversity conservation. Digital documentation will guarantee farm compliance with quality, environmental and social commitment criteria. More importantly, digital practices may address issues related to climate change.

Case study 4: Tech adoption beyond farming

Farmers are increasingly using the application of technologies like sensors and wearable devices to monitor animals' health, behaviour and productivity, data analytics and robotic automation and remote monitoring of live stocks in their new-age farming practices. These applications are being used across the animal husbandry dairy, fisheries and poultry, among others, and exploring ways to increase output, efficiency and animal welfare.



Two essentials for the success of agritech

As technology continues to develop, we will see more innovative ways to improve agritech practices. However, their success will depend on two factors.

- **Start-up ecosystem:** The key to strengthening the future of agriculture will be innovation by agritech start-ups that will bring the right mix of technology to agriculture. Agritech start-ups will play an essential role in
 - developing seamless digital platforms that can fully integrate data collection at every point;
 - bringing data integration capabilities of digital agricultural solutions and support actors in the value chain;
 - providing intelligence using historical and real-time agricultural data to deliver analytical patterns and valuable data;
- analysing data that can be accessed by anyone (post authorisation) at any time through big data and cloud computing and
- intelligent decision-making by processing data and forecasting alternate scenarios using the blockchain, AI and ML.
- **Connectivity:** New solutions, such as real-time monitoring, Unmanned Aerial Vehicles (UAVs), virtual consultation and maintenance, robotics and cloud repositories will need to be improved and require seamless connectivity. As technological innovations result in increasing use cases, a greater demand for next-gen technologies that are gaining traction throughout the agritech sector—such as 6G, AI-ML and UAVs—will be developed by 2030.¹⁰

¹⁰<https://www.youthapps.in/2023/04/remote-farm-equipment-management-through-6g-revolutionizing-agriculture.html>

Digitisation and industry



Next-gen communication

With the advent of the 5G in the telecommunication sector, communication technology is slated to not only fulfil the communication needs of humans but also serve as a catalyst to digital transformation and a driving force in shaping human lives, society, businesses and the government.

5G would unlock a plethora of use cases driving digital transformation across enterprises

The launch of 5G begins a new era for India's digitisation journey. As it becomes more widely available, more innovative and ground-breaking applications for next-gen technologies will emerge. Recognising its importance, India has aggressively ramped up the rollout of the 5G network throughout the country. Since the launch of 5G services in October 2022, 200,000 sites covering 700 districts were installed in just eight months. The 5G network has been rolled out in all 28 states and 8 Union Territories.¹¹ The road map for rolling out 5G services is planned to cover approximately 4,500 cities and towns over the next year.¹²

By 2040, the economic contribution of 5G could be as much as US\$ 455 billion.¹³ 5G technologies will enable more efficient and productive economic activity and revolutionise a wide range of use cases. Manufacturing, retail, information and communication, agriculture, public administration and defence,

finance and insurance will be among the highest contributing industries (as shown in Figure 7).

5G focuses on software-isation and virtualisation of the previous generations of technology while offering a higher capacity, coverage, and enhanced performance characteristics with improved security. Further developments will enable the core characteristics of 5G technology as formulated by the International Telecommunication Union (ITU), thereby unlocking a wide spectrum of use cases that were not feasible to implement previously. These characteristics include

- Enhanced Mobile Broadband (eMBB),
- Ultra-Reliable Low Latency Communications (URLLC) and
- Massive Machine-Type Communications (mMTC).

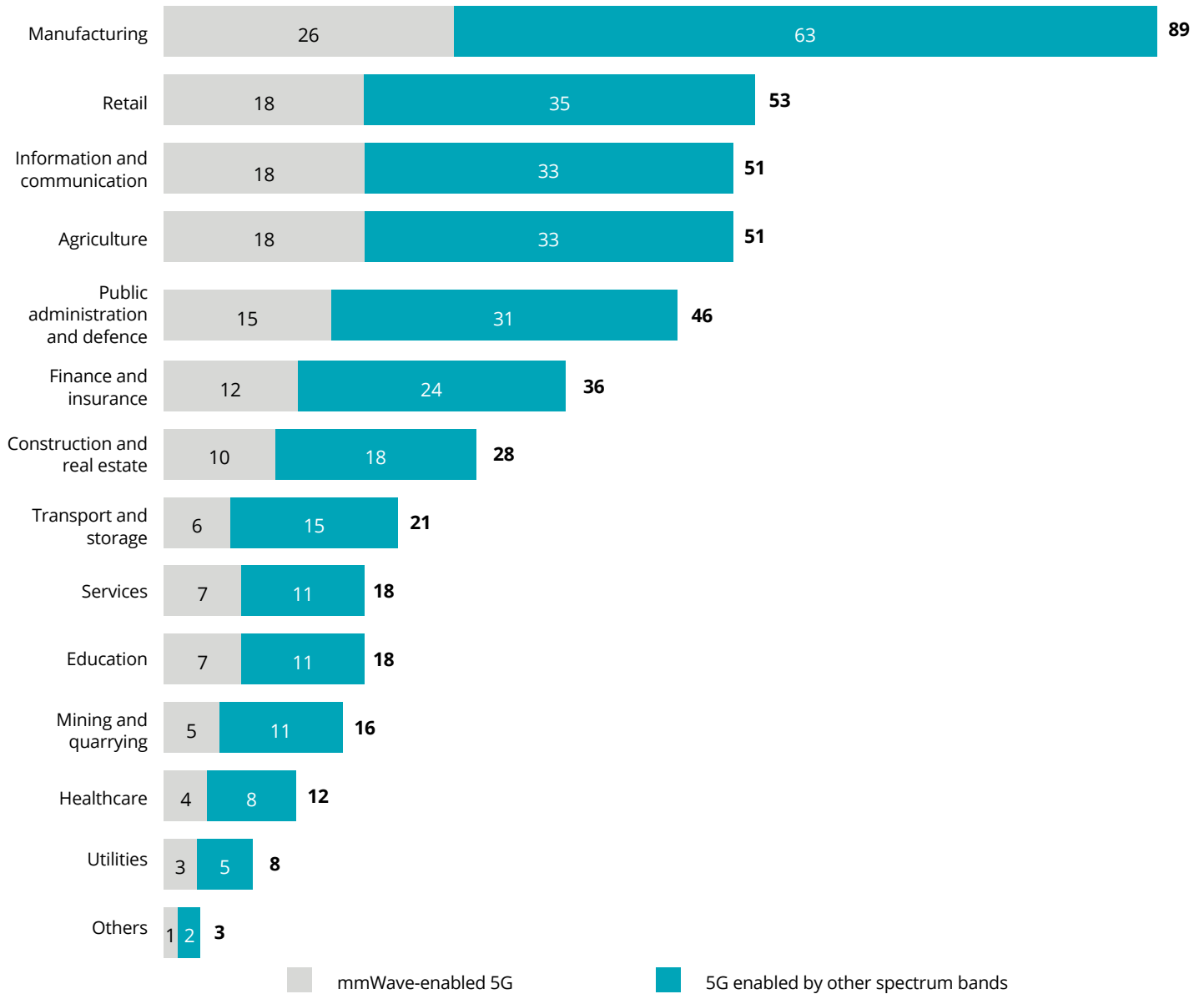
These features are paving the way for emerging technologies, such as IoT, Cloud, Edge Computing, AR/VR, AI-ML and Metaverse, which are connected to a vast network of devices and systems (Figure 8).

¹¹<https://pib.gov.in/PressReleasePage.aspx?PRID=1927062>.

¹²<https://www.counterpointresearch.com/5g-rollout-accelerates-in-india/>.

¹³<https://www.gsma.com/asia-pacific/wp-content/uploads/2022/09/India-report-FINAL-WEB.pdf>.

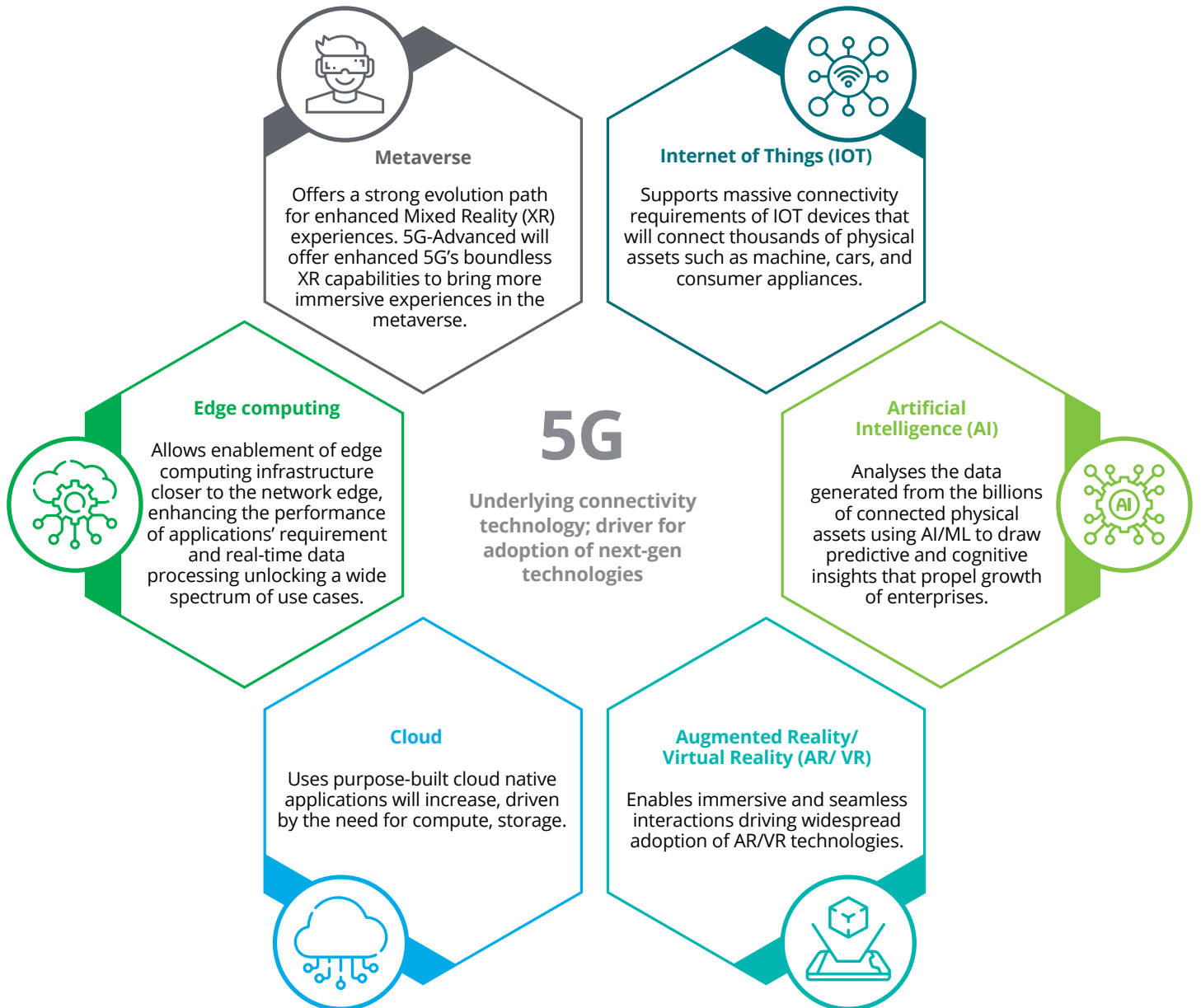
Figure 7. India: Economic impact of 5G by sector (in US\$ billion) (2023–2040)¹⁴



Note: Contributions by sector are estimated based on the source data.
 Source: GSMA India Report

¹⁴<https://www.gsma.com/spectrum/wp-content/uploads/2020/11/mmWave-5G-in-India.pdf>

Figure 8. 5G: Key drivers for the adoption of next-gen technologies



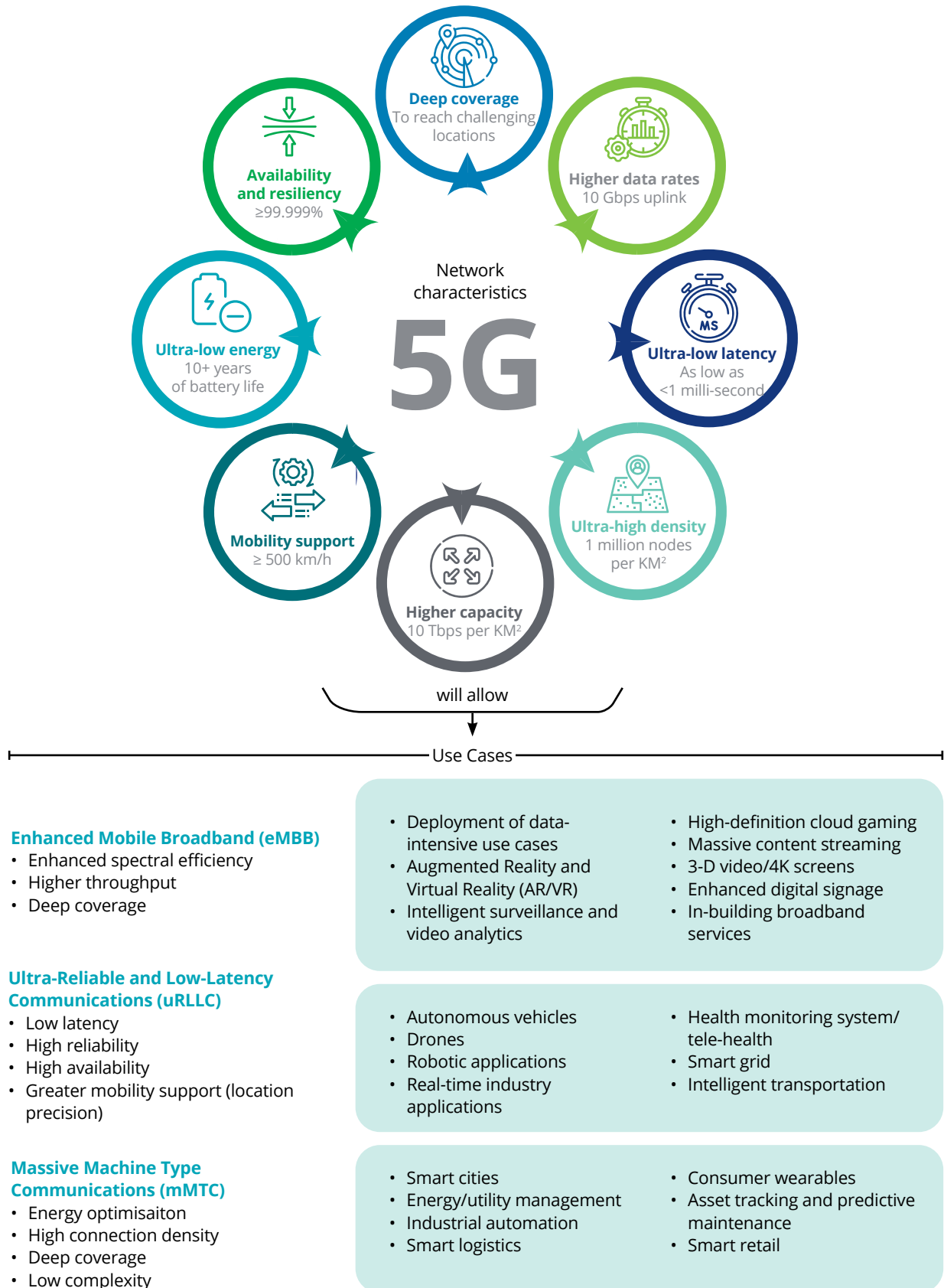
Source: Deloitte Research.

5G enables seamless connectivity, leveraging URLLC and mMTC features to efficiently drive mission-critical IoT and Industrial IoT (IIoT) applications. It will enable enterprises to unlock the full capabilities of next-generation communication technology by integrating these features across their business applications (as shown in Figure 9).

Using the non-standalone mode of deployment, service providers can deliver high-speed connectivity to consumers and

eMBB use cases for enterprises. Using the standalone mode, telco operators will be able to provide network slicing and create network segments, separating users, devices or use cases that require particularly high service quality, extreme reliability, precise positioning, ultra-low latency or high-level security. This will allow them to provide dedicated and innovative services across multiple sectors extending to URLLC and mMTC use cases supporting a massive IoT network.

Figure 9. 5G networks significantly improved networks enabling a wide spectrum of use cases



Source: Deloitte Research.

5G has the potential to revolutionise a wide range of use cases while improving the quality of life for individuals across the country. More importantly, from a business-to-business (B2B) perspective, the full value of 5G is yet to be unlocked. Given that only 10–15 percent of urban India has 5G coverage and that covering the entire Indian subcontinent would require Indian telcos to spend approximately US\$ 19.5 billion¹⁵ in developing advanced 5G infrastructure by 2025 to strengthen their wireless infrastructure, the way forward will require a collaborative approach.¹⁶

Evolution of 6G

Despite the early stages of the 5G rollout, the government is already aspiring to build sixth-generation technology. India is now contributing to the design and development of next-gen communication technologies, such as 6G by means of government, industry and academia collaboration. India has already registered more than 100 patents in 6G technology.¹⁷ With their indigenous 4G/5G stack developed, many countries

are expressing an interest in India's homegrown technology stack. By 2035, we expect telecom to take a significant leap towards establishing a next-generation ecosystem, thereby giving a significant impetus to the efforts being undertaken to develop indigenous technology stacks.

Globally, 6G is expected to be available by 2030 and is expected to surpass the valuation of US\$ 300 billion by 2033.¹⁸ As it will operate in the terahertz band of frequencies, it will provide superior coverage and capacity due to its wider range of spectrum usage. 6G will be built upon the 5G technology stack to provide unprecedented speeds (e.g., it will be 100 times faster than 5G)¹⁹ and ultra-low latency (e.g., featuring potentially less than a millisecond to microseconds of latency). Integrating ultra-low-latency communications with massive access (mURLLC) 6G wireless networks will provide a wide range of delay-sensitive, real-time services and applications by satisfying users' stringent requirements.

¹⁵<https://telecom.economicstimes.indiatimes.com/news/indian-telcos-to-spend-19-5-bn-on-5g-infra-by-2025-gsma/94117276>.

¹⁶<https://data.gsmaintelligence.com/api-web/v2/research-file-download?id=74383454&file=130922-India-digital-nation.pdf>.

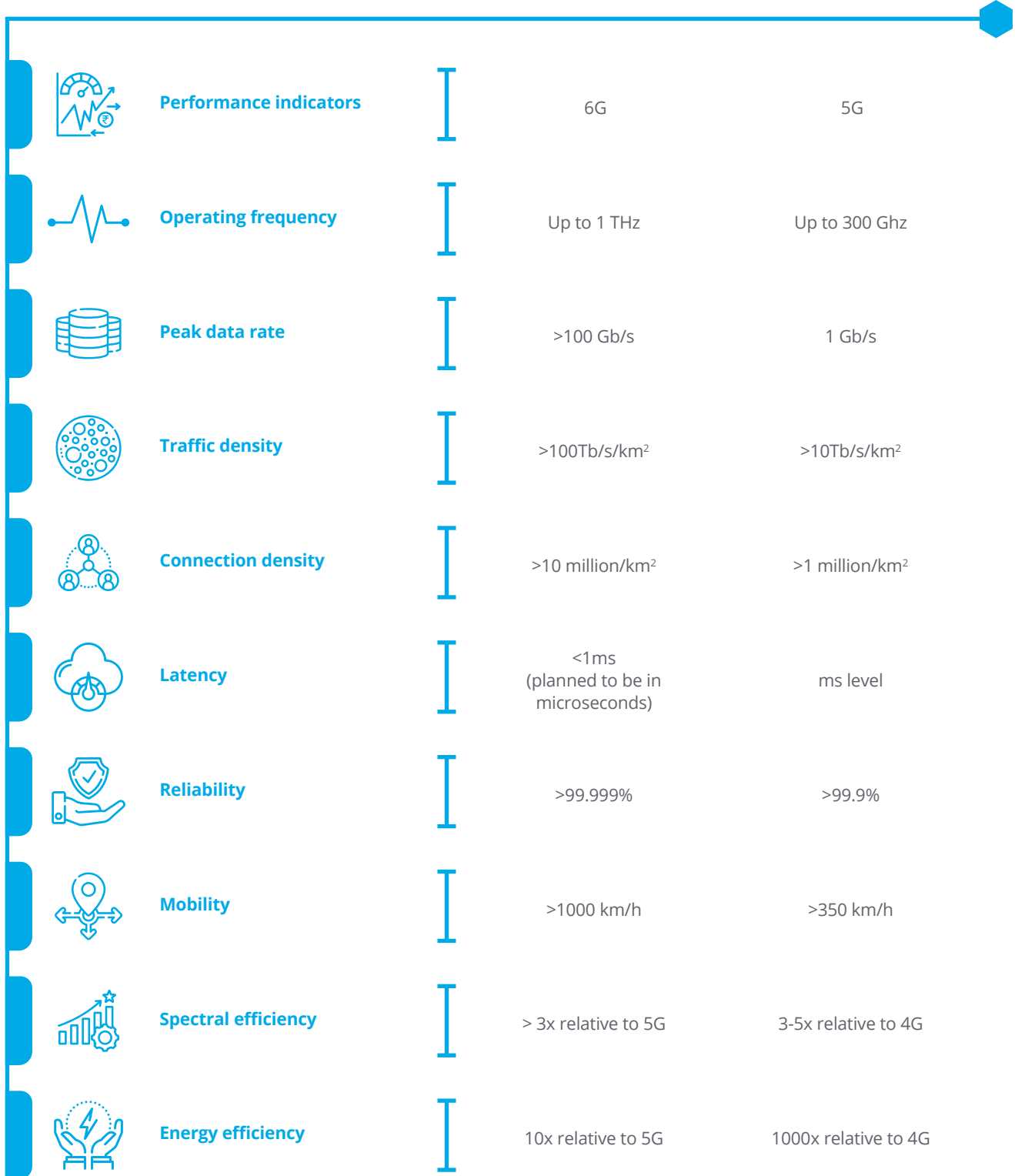
¹⁷<https://pib.gov.in/PressReleasePage.aspx?PRID=1927062>.

¹⁸<https://www.communicationstoday.co.in/6g-market-size-is-rising-at-5-cagr-to-surpass-us-300-billion-by-2033/>.

¹⁹<https://dot.gov.in/bharat-6g>.



Figure 10. 5G vs. 6G: A comparison of performance indicators



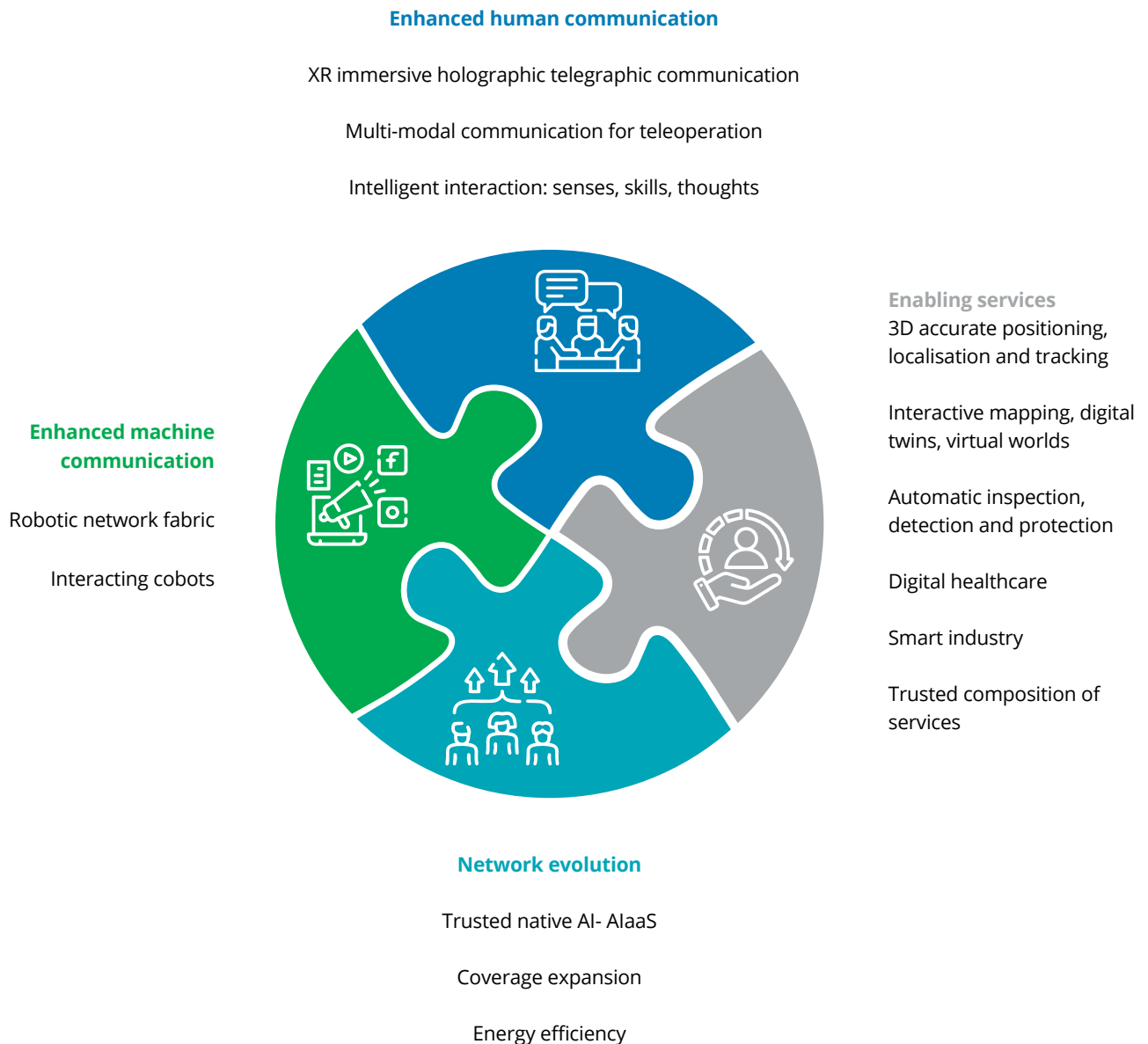
Source: Deloitte Research.

5G will eventually transition to 6G, and 6G will yield a far superior advancement in next-gen network technology (as shown in Figure 10), including intelligent network management controls and integrated wireless sensing communications. Further, 6G balances the potentially negative consequences of its carbon footprint by means of its lower level of energy consumption.

The primary focus of 6G technology will be to foster the widespread use of digital twins (i.e., real-time replicas of physical processes) utilising past and present data with AI-

ML capabilities.²⁰ This will enable the seamless convergence of humans with digital entities in a connected ecosystem in which one may move freely between the cyber and physical continuum, thereby establishing a connected physical world of senses along with its programmable digital representation.²¹ Additionally, with a 6G-powered truly immersive extended reality, high-fidelity holographic imaging will begin to emerge. A wide range of next-gen technologies will undergo advancement driven by 6G, as detailed in Figure 11.

Figure 11. Illustrative 6G use cases²²



Source: Next Generation Mobile Networks Alliance

²⁰<https://www.nokia.com/about-us/newsroom/articles/6g-explained/>.

²¹<https://www.ericsson.com/en/reports-and-papers/white-papers/a-research-outlook-towards-6g>.

²²<https://www.ngmn.org/wp-content/uploads/220222-NGMN-6G-Use-Cases-and-Analysis-1.pdf>.

Enhanced satellite communication

Although recent technological advances have made it possible to achieve impressive broadband speeds, one technology that stands out for its potential to provide “connectivity to all” (even in the most remote, disconnected locations) is satellite networks.

Multi-satellite services will improve speeds and rationalise prices, while the use case horizon for satellite broadband will expand to emergency response communications and last-mile and backhaul services for connecting rural areas. In India, satellite-based communications will emerge as an inherent part of the blueprint for delivering quality Internet services to citizens and enterprises. Considering the vastness of the Indian geography and the challenges of broadband connectivity (especially in rural areas), broadband satellite networks will be

crucial to ensuring ubiquitous connectivity, even to the remotest regions—where establishing connectivity through mobile towers and fibre deployment is not feasible.

By 2030, Deloitte predicts that India’s satellite broadband service market will reach US\$ 1.9 billion and grow at a CAGR of 36 percent.²³ However, to achieve this, there must coordination between operators, service providers and the government. Indian communication service providers (CSPs) are partnering with the SATCOM operators to design “mega-constellations” of satellites with potential use cases across businesses, industries and academics, among others. In April 2023, the Indian cabinet approved the Indian Space Policy, which allows the private sector to work with the government to carry out end-to-end satellite communication tasks and to construct spaceports and mobile launch platforms.²⁴

The convergence and coexistence of wireless technologies like 5G and satellite communication is inevitable. Satellites are expected to play a more complementary role in telecom networks, with both technologies working in tandem for a wider diversity of functions.

Future of manufacturing

From Research and Development (R&D) to quality assurance, technology has transformed the entire manufacturing value chain of a product over the years. Rapid technological advancements will redefine the next phase of manufacturing growth and innovation. The future of manufacturing will encompass a strong digital infrastructure, giving rise to smart factories with connected devices and data-rich production systems.

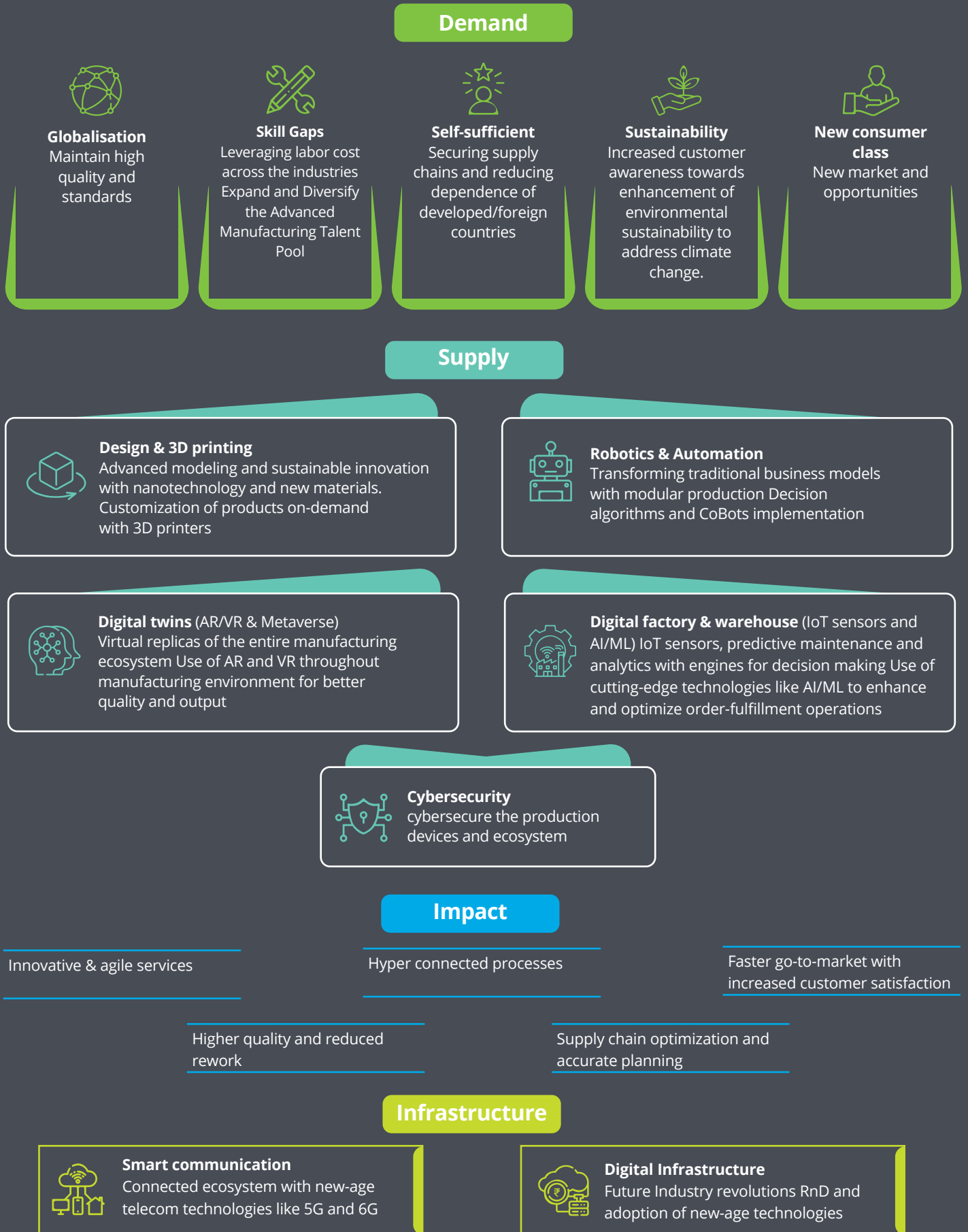
The drive to digitisation has been a function of both global demand and supply factors leading to the establishment of Industry 4.0 as it exists today. Globalisation, the emergence of

socially responsible consumers, skill gaps and governments’ commitment to sustainability have all pushed the industry to innovate and diversify manufacturing (Figure 12).

²³<https://www2.deloitte.com/in/en/pages/technology-media-and-telecommunications/articles/tmt-predictions-2023.html>.

²⁴<https://www.pib.gov.in/PressReleaseDetailm.aspx?PRID=1917307>.

Figure 12. Digital trends of re-shaping the manufacturing value chain



Source: CB Insights, Deloitte Research.



Evolution of manufacturing

However, the path ahead will lead to a new era that will focus on human–tech partnerships.²⁵ The industrial revolution will extend beyond manufacturing techniques and evolve to incorporate improved resilience, a human-centric strategy and a sustainability focus in three distinct stages.

In the **near term**, we may expect the following to occur:

- **3D printing or additive manufacturing technology** will provide flexibility in production, aid in achieving economies of scale, accelerate the customisation of on-demand products using sustainable materials, compress design cycles and reduce the time required to go to market.
- **Robotics and automation** will help deliver products that meet global standards with fewer errors at a reduced cost. The smart use of co-bots (robots supporting existing workers) will help perform complex tasks and minimise rework.
- **Metaverse and AR/VR technologies** will provide immersive and interactive experiences that help workers learn new skills, improve quality control, perform maintenance more efficiently, collaborate more effectively and work more safely.
- **IoT sensors and AI/ML along with data analytics** (integrated throughout digital factories and warehouses) will aid in

optimising the manufacturing process, resource use and the supply chain. This will result in hyper-connected processes and improve efficiency by enabling a new, higher level of information processing, monitoring, collection and analysis.

- **New-age telecom technologies like 5G and 6G** will provide a strong and reliable network at an optimal cost to ensure the smooth transmission of data, successful implementation of integrated and connected smart factories in the age of IoT and defence against cyberattacks by means of encryption techniques.²⁶


In the **medium term**, we may expect the following to occur: We may see a massive increase in the use of digital twins as they mature and replicate the entire organisation and drive radical advancements in the manufacturing industry (as shown in Figure 13). The same thing may happen with predictive analytics, which will evolve into a discipline that is prescriptive in nature—it will not only perform the analysis but also inform the specific actions that should be taken to ensure that any predictions can be reversed correctly or improved. In this way, analytics will go beyond simple prediction and advise on corrective actions on a proactive basis.

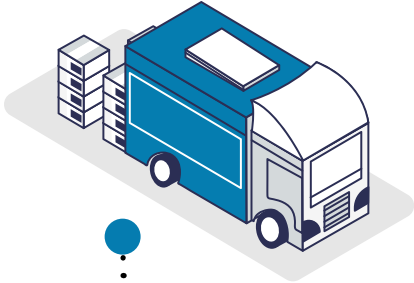
²⁵<https://www.twi-global.com/technical-knowledge/faqs/industry-5-0>.

²⁶<https://www.yash.com/blog/how-6g-technology-will-revolutionize-industries-and-create-new-opportunities/>. | Author - Sacheen Patil



Figure 13. Factories of the future

 Different production components from different suppliers

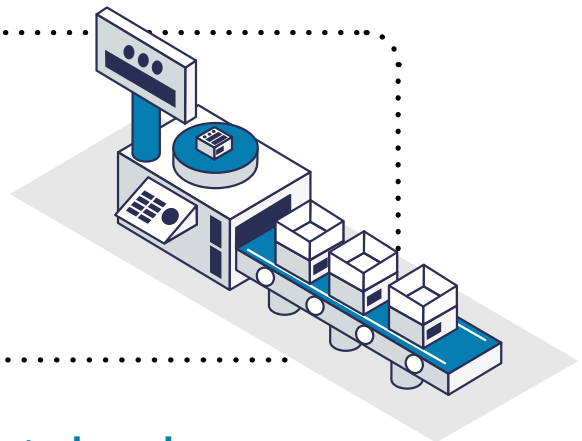


01 Connected logistics integrated with operations

The company has visibility across various aspects —ranging from quality and efficiency to the delivery stage and other critical production components (being delivered by different suppliers). The connected logistics ecosystem enables the company to collaborate with critical suppliers to mitigate quality check, delivery, and operations challenges. The company can further track the real-time shipping of final products and predict delivery time.

02 Connected operations

The end-user can also track the different stages of their final product — including production status, quality, delivery status, and estimated delivery time —granting visibility of the final product implementation plan.



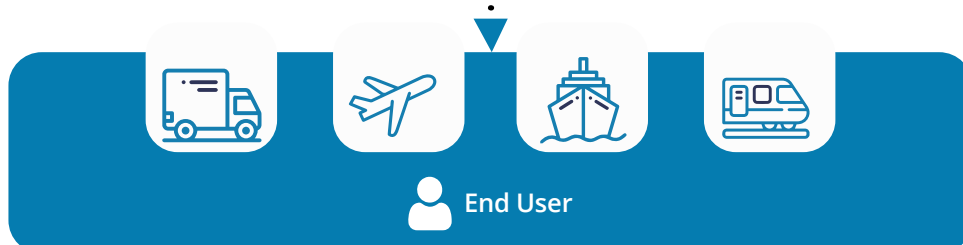
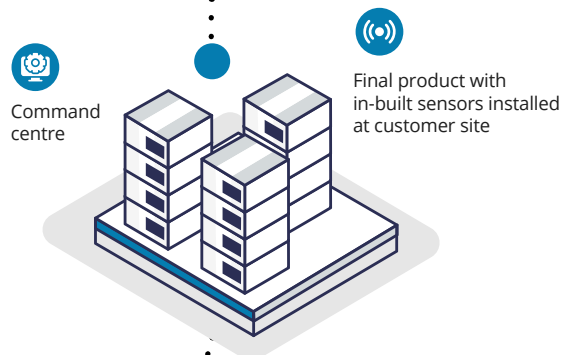
03 Connected workers

Workers are trained on desired technical skills and have access to interactive simulations and tutorials. This enables automated tasks, improved collaboration, and streamlined processes. This can lead to increased efficiency. Wearables are used to monitor workers' health and safety, while sensors detect hazards in the workplace. These advancements result in an improved quality of the product.



04 Connected product

The products that are in service are connected to the command centre through sensors. This transmits the product's health and critical data to the manufacturing company, alerting them of possible failures. This enables predictive maintenance, reduces downtime, and builds customer trust. Additionally, the manufacturer can use the data collected from different installed products to improve product design, efficiency, and quality. This provides an opportunity to offer it as an additive service.



Going further into the future, we may expect the following to occur:

The Sixth Industrial Revolution (illustrated graphically in Figure 14) will create opportunities for manufacturers to:

- explore areas beyond their existing business models and venture into new markets;
- address complex business issues in a more efficient way;
- improve supply chain management by utilising superior tracking systems enabled by blockchain technology and by using predictive analytics to forecast demand.

The overall influence of generative AI on smart manufacturing is still quite hypothetical and in its early phases of development. Future applications of this technology to smart manufacturing will provide many intriguing possibilities. Some of these are mentioned below:

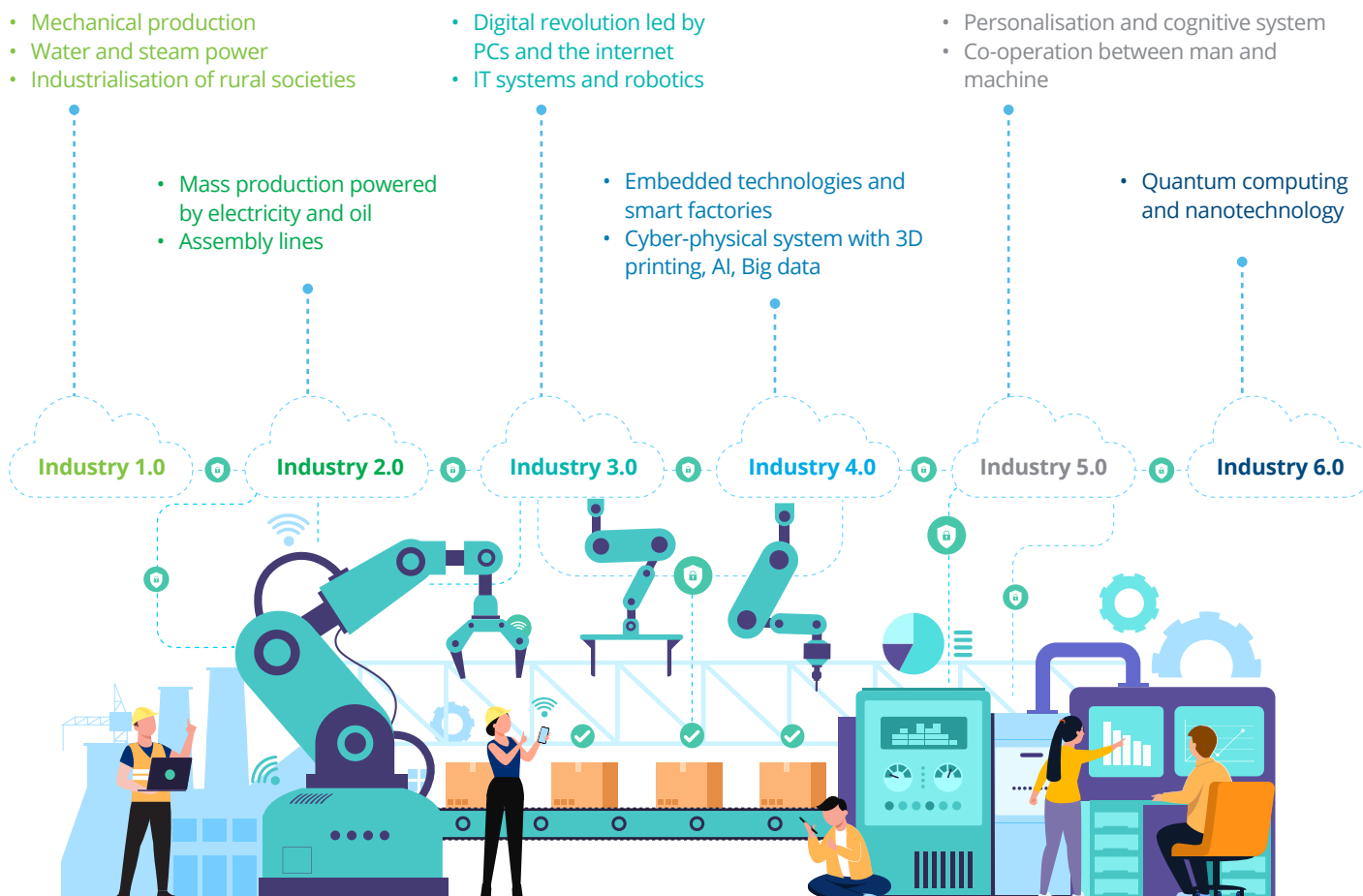
- Improving product design (rapid prototyping and design of new products that were previously unimaginable, thereby reducing the time to market)

- Enabling process automation and material handling (i.e., creating automated synthetic data and code generation for robots)
- Product personalisation and optimisation of manufacturing processes by identifying the most efficient and effective ways to enhance operations and maintenance instructions
- Establishing an automated shopfloor (i.e., task automation through multi-modal robots) and
- Using predictive analytics to forecast demand and supply

Quantum computers, another distant but highly potent technology, may be used in the following ways:

- Design new materials and products
- Allow more precise and accurate testing and prototyping, thereby reducing costs
- Manage areas such as real-time supply chain optimisation, processes and quality optimisation as well as implement cybersecurity solutions using quantum encryption

Figure 14. Landscape of the industrial revolution



Source: Springer, Deloitte Research.

India strives to create a new-age factory for the world

China has become a major player in global manufacturing over the last 30 years. However, the COVID-19 pandemic and geopolitical uncertainty has prompted multinational corporations (MNCs) to focus more on supply chain resilience. This shift in global value chains has led to competition among nations, including India, to gain a greater share of the global manufacturing market.

India will require a focused strategy that goes beyond labour cost arbitrage to labour capability advantage backed by technology-driven processes. Moreover, Indian manufacturers will need to accelerate their digital adoption to become future-ready. By utilising technology, this sector will be able to reap the benefits of economies of scale and accelerate its integration into the global value chain. However, this will require focused efforts as mentioned below:



Strong government initiatives to modernise manufacturing and achieve self-reliance will be important. The role of the government will be that of a regulator and enabler to make India a “product developer and manufacturing nation.” Schemes and initiatives such as Digital India, the production-linked incentive scheme for local production of telecom equipment, the launch of 5G and Samarth Udyog Bharat 4.0, among others, will propel the growth of new-age manufacturing in India.



Strengthening public-private partnerships in building the physical and digital infrastructure for the transition from Industry 4.0 to 6.0. This will require the development and sharing of industry-relevant facilities, co-location of tools, the development of technology test beds and embedded expertise. By 2030, this approach will give rise to regional innovation ecosystems and may stimulate economic growth both within and between regions.



Collaborative (open-source) business models for smart manufacturing driven by both start-ups and large enterprises. Start-ups that lack legacy systems and procedures (which frequently impede larger organisations) will generate novel ideas and creative methods as they can develop and deploy new technologies quickly. Large businesses will have the means and the know-how to scale up and incorporate new technologies into their current manufacturing procedures. Collaboration will result in the creation of open-source infrastructure, making innovation accessible to all.

India as a “semicon nation”

India’s chip manufacturing sector is still in its nascent stage, yet it is growing. With China-plus-one diversification underway, India will be well-positioned to be a significant player in the global value chain. India aims to become a leading semiconductor design capital of the world like the Chip4alliance countries, which includes the United States, Taiwan, South Korea and Japan.²⁷

²⁷<https://www.india-briefing.com/news/setting-up-a-semiconductor-fabrication-plant-in-india-what-foreign-investors-should-know-22009.html/>.

Semiconductors are everywhere. They are key components in smartphones, cloud servers, new-age cars, IoT devices and even in critical infrastructure. Every subsequent generation of an electronic gadget has seen a significant rise in the use of semiconductor chips to support its advanced technology. Rising digitisation in the post-COVID era between industry, businesses and consumers has further boosted the application of digital products. This may only be the beginning as this increasing demand will further accelerate with the growing application of miniaturised electronic equipment across telecommunication devices, mobile and personal computing devices, IT, original equipment manufacturers (OEMs), office automation (OA), industrial machinery and automobile manufacturing.

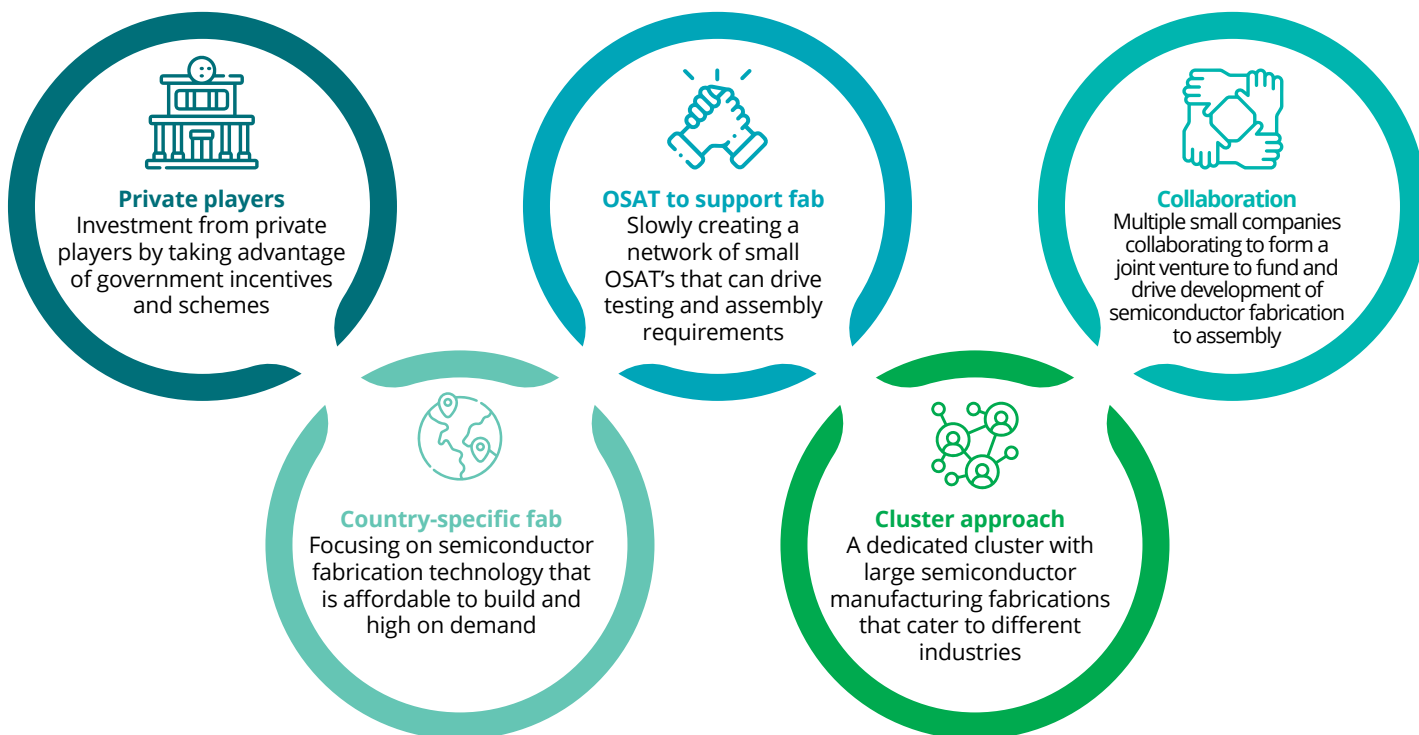
India's opportunity

Currently, the global semiconductor value chain for each stage is distributed only to a few regions. Chip design and major R&D are cantered in the United States and Europe, whereas semiconductor fabrication units known as foundries, which includes wafer fabrication, are mainly located in East Asian countries. Taiwan and South Korea alone comprise about 80 percent of the global semiconductor foundry market.²⁸ This

makes the global semiconductor value chain highly vulnerable to global uncertainty as we recently witnessed during the U.S.–China trade war and the COVID-19 pandemic. Nations are seeking to diversify their supplier base and construct new onshore facilities. This provides India with an immense opportunity to become a part of the global value chain in this industry. Growth in the software and services industries further promotes taking advantage of this opportunity to gain a stronger position in semiconductor design and manufacturing.

However, India is currently dependent on imports to meet its domestic demand. In 2021, India imported a staggering US\$ 5.38 billion in semiconductor devices, becoming the seventh-largest importer of semiconductor devices in the world. Consequently, India's manufacturing sector (especially the automobile and mobile phone industries) remains highly dependent on the countries from which India imports. In 2021, the government rolled out a US\$ 10 billion initiative to make India more self-reliant in terms of semiconductor imports by allocating.²⁹ Further, this initiative was revised to make it more attractive to investors.

Figure 15. Semiconductor manufacturing value chain



Source: Deloitte Research

²⁸https://country.eiu.com/article.aspx?articleid=1222633905&Country=South+Korea&topic=Politics&subt_1.

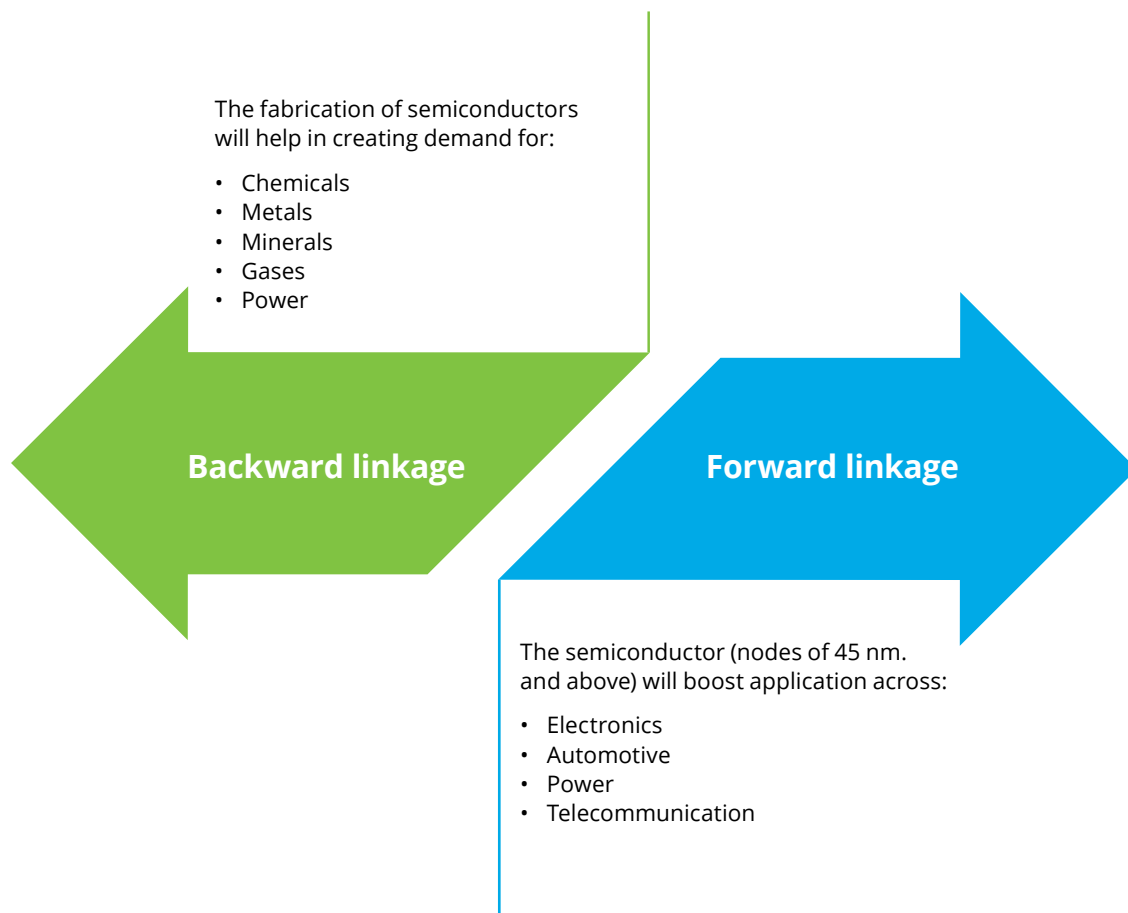
²⁹<https://pib.gov.in/PressReleasePage.aspx?PRID=1781723>.

The semiconductor chip manufacturing supply chain is complex due to multiple supply routes and hand-changes that must occur before the ultimate delivery of the final product³⁰ (as shown in Figure 15). India recognises the necessity of contributions from both the government and industry players by understanding the complexity of the supply chain and thus raising capital.

Several investments have been channelled into the semiconductors space since the approval of the Programme for

Development of Semiconductors and Display Manufacturing Ecosystem. As the in-house semiconductor manufacturing ecosystem matures, the sector will create strong backward and forward linkages in the digitisation world. This will create demand for chemicals, metals, minerals, gases and power—with a strong backward linkage (as shown in Figure 16). It will also promote the success of start-ups and incubators, which are currently growing at a staggering pace.

Figure 16. The forward and backward linkages of the semiconductor sector boosting digitisation



Source: Deloitte Research

³⁰https://www.tsmc.com/english/aboutTSMC/dc_infographics_supplychain.

India will simultaneously achieve a higher degree of self-sufficiency by creating strong forward linkages. The metal oxide semiconductor field-effect transistor (MOSFET) technology nodes of 45 nm and above have high demand, driven by the electronics, automotive, power and telecom applications. This segment accounts for almost 50 percent of the entire semiconductor market.³¹ Support from the government across all technology nodes for developing semiconductor fabrication capabilities will help India progress towards the establishment of its own semiconductor ecosystem. Self-sufficiency will cater to domestic demand for other industries, helping them ramp up their own digitisation journey in the years ahead as they will not have to depend on other nations for their semiconductor supply. In this way, end-user industries will be better able to meet the changing preferences of consumers. This achievement will also enable India to participate in the global semiconductor value chain.

The Indian semiconductor market is expected to reach US\$ 120 billion by 2030, and it will cater to approximately 12 percent of the global semiconductor market (US\$ 1 trillion).³² However, the industry will go through a transformation as investment in AI and automation increases, which is currently occurring in India. Although conventional processors will help manufacture electronic gadgets, such as mobiles and laptops, processors will also evolve to meet the demand for AI processors and applications, leading to more innovation. As digitisation transforms the economy, the semiconductor industry will meet the need for customisation of processing requirements across AI, automotive and electronics industries to improve the capabilities and adaptabilities of the underlying processing chips.

Creating demand for new skills

- India is host to one of the largest R&D centres outside of the headquarters for some of the most prominent semiconductor enterprises. In August 2022, these R&D centres employed about 55,000 design engineers, which accounts for 20 percent of the total global talent pool.³³ However, as per the estimation, R&D will create 75,000 jobs by 2026, whereas supporting value-added activities, such as logistics will create an additional 25,000 jobs.³⁴ With the increase in semiconductor manufacturing in India, R&D will move past traditional domains to greater value-added research such as material science, system-on-chip (SoC), electromagnetics, plasma chemistry, lithography, microelectronics, silicon processing, smart factory automation and chip design research, thereby creating demand for skills in these areas.
- The current focus remains mainly on chip design process engineering and back-end support functions. This presents the need for a highly skilled workforce that specialises in chip design and manufacturing to support the growth of India's semiconductor industry. It is estimated that about 150,000 jobs will be created across the value chain (i.e., manufacturing, assembling, packaging, and testing).

India is making its next big leap in establishing and driving indigenous semiconductor fabrication units.³⁴ This will prompt increased participation in the industry and promote collaboration with academia to provide training and internship opportunities to students and investments in Electronic Design Automation (EDA) and Intellectual Property to develop new technologies and products.

Evolution of cloud-based services

Strong growth in cloud-based services will come from the rising demand for digital platforms, as India aspires to realise the “Digital India” dream. Cloud-enabled technologies will aid in powering the core themes of Digital India’s vision.

³¹<https://pib.gov.in/PressReleasePage.aspx?PRID=1861129>.

³²<https://www.digitimes.com/news/a20230109VL202/forecast.html>.

³³<https://www.businesstoday.in/india-at-100/story/india-to-become-a-major-semiconductor-manufacturing-nation-in-next-5-6-years-minister-ashwini-vaishnaw-345753-2022-08-26>.

³⁴<https://www2.deloitte.com/in/en/pages/technology-media-and-telecommunications/articles/tmt-predictions-2023.html>.

The shift among businesses to cloud-based services started picking up pace in the early 2010s when major hyper-scalers started setting up their businesses in India. Between 2017 and 2021, potential investments in cloud transformation tripled with the growth of digital services. It enables cloud service providers to expand their business while providing scalability, flexibility, rapid elasticity, faster implementation, lower deployment cost, ubiquitous access and greater resiliency, among others. Further, in the post-COVID era, the need to “go digital” accelerated the dependency on cloud-based services with shifting enterprise priorities, such as remote workforce accessibility, growing demand for digital channels, and the need for moving from legacy technology infrastructure and databases to modern cloud-based database models.

Cloud services will become a strategic priority for enterprises, small and medium-sized businesses (SMBs), start-ups, and the government to achieve their business goals with accelerated time to market in a secure manner (mostly by contracting out). Many are prioritising the pay-per-use model instead of building the cloud infrastructure themselves, making it more cost-effective. This is because of the growing needs for data storage, analytics and insight solutions across different dimensions of the cloud models among infrastructure as a service (IaaS) (storage/compute), platform as a service (PaaS) (developer sandbox) and software as a service (SaaS) (end-user applications). For instance, developments in AI/ML supported by large language models (LLMs) require powerful and highly scalable computing capabilities to process real-time data. Therefore, the need for massive storage and computing resources will require elastic cloud platforms to meet the growing demand for computing and storage power. Migrating their resources from on-premises to a cloud model will minimise enterprises' need for expensive hardware equipment to stay connected with the world. The cloud market is expected to reach a volume of US\$ 881.80 billion by 2027.³⁵

Cloud-contributing to the economy

In India, the value added from cloud contribution to India's

GDP is recorded as US\$ 70–90 billion in 2021.³⁶ A significant share of this growth is coming from large-scale cloud transformations driven by the network-centric government's digital infrastructure (India Stack) in the space of e-commerce (ONDC), healthcare (ABDM), fintech (UPI) using NIC (National Informatics Centre) cloud (MeghRaj) and e-governance portals. This contribution is set to increase fourfold and will reach US\$ 310–380 billion in 2026, accounting for approximately 8 percent of the total GDP. Further, the Indian public cloud services market (including IaaS, PaaS and SaaS) has recorded a revenue of US\$ 6.2 billion in 2022 and is forecast to grow at a five-year CAGR of 23.4 percent for 2022-2027. It is expected to reach US\$ 17.8 billion by 2027.³⁷ Approximately 53 percent of enterprises increased their cloud adoption in the past year, and 84 percent of large organisations have adopted SaaS.³⁸

- **Foundation for start-ups and SMBs:** The cloud will enable these enterprises to innovate and reach out to diverse markets without incurring high investments in their early stage. Such services will also provide them access to high-end technologies to compete with larger organisations and help them deploy complex algorithms at a fraction of the price of traditional on-premise models.
- **Investment and employment:** A concerted effort might lead to an aided trend of India becoming a skill hub for cloud tooling so that large-scale global implementations can operate from here. These trends will require an increase in cloud investment by 25–30 percent over the next five years, with the investment reaching US\$ 18.5 billion. Further, the cloud services in India are expected to create approximately 14 million direct and indirect employment opportunities with a threefold growth rate by 2026.³⁹

Cloud-based services are emerging to meet novel demand

The proliferation of digital infrastructure, serverless architecture and data centre management will result in the adoption of novel cloud-based solutions. Currently, with the shifting of cloud architecture design towards edge computing, there is a growing concern about the ability to manage and control data, networks, operating systems, storage and even individual application capabilities. A wider range of audiences are expected to be

³⁵<https://www.statista.com/outlook/tmo/public-cloud/worldwide>.

³⁶<https://www.nasscom.in/knowledge-center/publications/future-cloud-and-its-economic-impact-opportunity-india>.

³⁷<https://www.idc.com/getdoc.jsp?containerId=prAP50777423>

³⁸<https://www.nasscom.in/knowledge-center/publications/future-cloud-and-its-economic-impact-opportunity-india>.

³⁹<https://nasscom.in/knowledge-center/publications/future-cloud-and-its-economic-impact-opportunity-india/>.

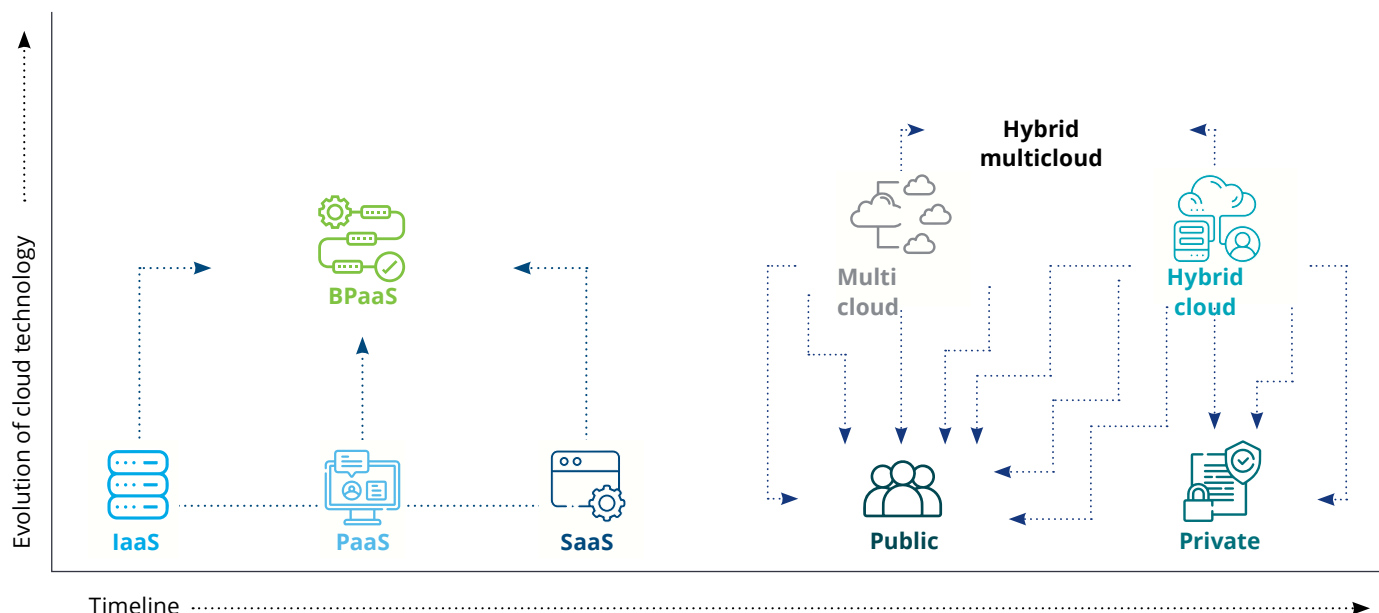
catered to by the SaaS model and supported by providers (see Figure 17). In the coming years, SaaS may become the easiest and most cost-effective way to modernise traditional systems, enhance omnichannel customer experiences via real-time data analytics and connected platforms and improve digital capabilities.⁴⁰ However, going forward, large cloud service providers—known as hyperscalers—should also focus on revamping their service solutions to meet evolving needs by utilising cloud-native features, embedded AI and composability.

- Business Process as a Service (BPaaS):** Over the next decade, service providers will also be availed from the cloud. We expect to see efforts to combine human creativity with digital technology, giving rise to the demand for outsourcing service solutions via the cloud in BPaaS based deployment models. This will improve the efficiency and affordability of business process management for enterprises and the government. Some of its new features in terms of the flexibility associated with multiple languages and scalable deployment environments will become yet another functionality that will enable businesses to achieve their objectives more cost-effectively. BPaaS is expected to optimise some common business functions—such as customer relationship management, supply chain management, financial management, human capital management and risk management, among others—by automating and streamlining

their business models.

- Hybrid and Multi-Cloud:** The other transition that we expect to see is that as businesses modernise their IT infrastructure initiatives, they will optimise the investment costs and transition towards adopting hybrid and multi-cloud strategies. Given the rising number of private and emerging players in the cloud space, vendor flexibility to move between multiple hyperscalers will help businesses optimise costs by using a hybrid infrastructure (i.e., the instantaneous switch between a public and private model) while focusing on core innovation and increased resilience. This transition towards hybrid and multi-cloud strategies will drive the market forward for several years to come, across a range of industries. According to a study by one of the leading hyper-converged cloud providers of India, the hybrid and multi-cloud infrastructure in India is currently at 12 percent of the total cloud infrastructure and is expected to increase fivefold to reach 63 percent in the next three years.⁴¹
- Edge AI:** Edge AI will complement cloud AI, enabling the resource-intensive training of algorithms in the cloud and then their seamless sharing at the edge without any latency. The combination of cloud connectivity and edge AI, along with 5G private networks and Wi-Fi 6 network technology, may tackle some of the largest and most complex business system issues, thereby fuelling the advancement of the Industry 5.0 revolution.

Figure 17. Adoption of cloud-based technologies



Source: Deloitte Research

⁴⁰<https://www.idc.com/getdoc.jsp?containerId=prAP49916322>.

⁴¹<https://www.nutanix.com/enterprise-cloud-index#nav-mixed-infrastructure>.

The way forward

Working with a heterogeneous mix of proprietary platforms, services and interfaces could be a barrier for companies to fully realise most of the benefits of their cloud investments. To simplify multi-cloud management, enterprises will have to turn to a layer of abstraction and automation that offers a single panel of control, known as the **meta-cloud, the supercloud or sky computing**. This will enable enterprises to better utilise and optimise their cloud investments as the workload becomes distributed across different service providers. With the rising interoperability of the digital infrastructure, cybersecurity will have to be prioritised.

Cloud technologies continue to disrupt and transform the ways of working across the government and public sector, private corporations and consumers at large. We believe that the following three priorities will be paramount:

- **Government and public sector:** The government, under the aegis of the Ministry of Electronics and Information Technology (MeitY) and many other agencies, will need to continue building

an ecosystem to support more broad-based cloud adoption, particularly for relatively underserved segments, such as MSMEs (Micro, Small and Medium Enterprises" involved in the processing, production, and preservation of goods and commodities).

- **Private corporations:** Enterprises in India largely increased the maturity curve in terms of cloud adoption, especially during the COVID-19 pandemic. Given the pace of change, organisations must be continually open to adopting disruptive technologies, applications and use cases such as multi-cloud architecture, enhanced cybersecurity, edge computing, secure access service edge and deeper AI/ML embedding, amongst others.
- **Talent pool:** India has approximately 0.6 million cloud professionals, and this number is expected to increase to approximately 1.5 million by 2025.⁴² The government should encourage partnerships between industry and academia to nurture the appropriate skills and encourage innovation among young minds to meet India's demand for professional cloud services and eventually position India as a premier talent hub in the cloud services space.

⁴²<https://indbiz.gov.in/cloud-professionals-in-india-to-rise-to-1-5mn-by-2025-nasscom-report/>.



India: The digital hub of the world



Endorse digital trust and infrastructure across the world

Over the last few years, India's digital solution across distributed architecture has established a reliable platform to foster innovation that has led to greater inclusion and transparency. As IMF recognised it, a few of these are now ubiquitous and have become a benchmark for other countries that are experiencing their own digital transformation.⁴³

In our earlier sections, we discussed how India's DPIs are revolutionising finance, health, education and many other services, empowering citizens and making the economy more resilient. The productivity and efficiency gains are increasing the government's revenues and limiting leakage in beneficiary programmes. It is estimated that India saved 1.1 percent of its GDP through March 2021 due to these digital infrastructures in combination with other governance and tax reforms.⁴⁴ Furthermore, the core digital economy is expected to contribute approximately 25 percent of India's total GDP by 2029.⁴⁵

The benefits of DPIs are now extending beyond geographic borders. The success of India's DPI is being internationally acknowledged and is offering an instructive example that other countries may follow. These DPIs are set to become the foundation for implementing more cost-effective and transparent solutions to addressing global issues of inclusion and empowerment.

Replicating India's success around the world

One of India's biggest strengths lies in its diversity. As a result, digital solutions built for such a varied population and culture make them agile and easy to customise, and they address a myriad of problems. The various platforms integrate technology, market needs and governance in unique ways that provide the government with the flexibility to build a digital ecosystem based on a common infrastructure for the masses. These platforms are interoperable and are designed to utilise the strengths of varied markets efficiently without compromising

transparency and trust. Moreover, these digital platforms are reinforced through open standards that enable anyone to use them and implement their functionality. The specifications are standardised across end-user applications, such as payments, identity, health and education and in terms of handling compliance requirements.

Because of these characteristics, it is easy for other countries seeking digital sovereignty to adopt and tailor DPGs that meet their unique national requirements. There is evidence that secure digital infrastructures are being considered by several international organisations for replication, including United Nations Development Programme (UNDP) and UNICEF.⁴⁶

By 2030, India will adopt the One Future Alliance strategy, bringing all nations and stakeholders together to collaborate, develop, build and create the next generation of DPIs that can be used by all countries and their people.⁴⁷ These cost-effective and transparent solutions are likely to benefit economies by enhancing inclusion, equity and development. They will also aid in designing interoperable solutions between nations, which will further assist in delivering services across borders by establishing trust and efficiency. According to a study by the UNDP, just financial inclusion and lower leakages using digital infrastructure will boost GDP growth by 1 percent to 1.4 percent by 2030 in low- and middle-income countries.⁴⁸

⁴³<https://www.imf.org/-/media/Files/Publications/WP/2023/English/wpiea2023078-print.pdf>.ashx.

⁴⁴<https://ies.gov.in/pdfs/dbt-in-india-by-tiwari-and-kamila.pdf>.

⁴⁵<https://economictimes.indiatimes.com/industry/banking/finance/kv-kamath-says-digital-economy-can-contribute-25-gdp-by-fy29/articleshow/98248649.cms?from=mdr>; https://ficci.in/sector/report/22289/news_wrap_feb27.pdf.

⁴⁶<https://www.undp.org/sites/g/files/zskgke326/files/2023-04/Digital%20Public%20Goods%20for%20the%20SDGs%20-%20Case%20Studies.pdf>.

⁴⁷<https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1931731>.

⁴⁸<https://digitalpublicgoods.net/Bold-Investments-Executive-Summary.pdf>.

Case study 5: The global adoption of the UPI

The UPI, introduced in 2016, is currently being used by nearly 260 million Indians⁴⁹ and has surpassed the use of credit and debit cards in the country. Now, the success is expanding beyond India's borders.

- In February 2023, India and Singapore collaboratively launched UPI-PayNow, a cross-border digital payment system.⁵⁰
- Neighbouring countries, such as Bhutan and Nepal also launched a UPI in April 2023.
- France recently adopted a UPI that will create new opportunities for Indians to spend money in France.⁵¹
- A UPI is being established to facilitate payment settlements across 10 locations, including the United Arab Emirates, Australia and Hong Kong, in the coming months.
- Japan is also considering using India's UPI payments system as both governments strive to promote digital collaboration by fostering interoperability wherein the digital payments system may facilitate cross-border payments.⁵²



Case study 6: The adoption potential of ONDC

The recently launched open-source e-commerce platform (based on Beckn protocol)—“Open Network Digital Commerce (ONDC)”—is a platform that is poised to become the next catalyst to drive a revolution in local commerce in India. Currently, ONDC enables any network-enabled application to explore and engage in local commerce across categories and sectors. Being open source, start-ups are encouraged to unbundle services and build specialised apps that enable accessibility for reliable services. It is expected that by 2030, ONDC could contribute between US\$ 60 billion and US\$ 80 billion to India's economy.⁵³

India's ONDC stack is expected to soon be integrated with the MSME Global Mart—a global B2B e marketing portal—which will facilitate market access and increased visibility for micro, small and medium-sized businesses.⁵⁴



Challenges of implementing a digital stack for the world

Digital trust demands that technologies abide by a set of standards that ensures reliability and instils confidence among users across geographies. Any failure may have systemic implications with the possibility of causing negative macroeconomic repercussions. Understandably, one domain alone cannot solve digital trust gap issues, such as security, privacy, and reliability. The ability to trust a technology providing a service must be supported by various criteria, such as

strong cybersecurity and safety for assets, effective privacy protection, transparent deployment, auditability, technological compatibility, the ability to seek restitution in the event of harm and fairness in application.⁵⁵ Unless these issues are addressed, their adoption and replication of India's success across geographies will remain limited. For instance, any DPI built on an ecosystem with a low level of digital security could undermine even the best intentions and efforts of a government to digitise its economy.

⁴⁹<https://m.economictimes.com/tech/technology/around-40-indians-use-digital-formats-like-upi-for-money-transfer-nandan-nilekani/articleshow/94203265.cms>.

⁵⁰<https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1900976>.

⁵¹<https://www.businesstoday.in/personal-finance/news/story/france-adopts-upi-a-look-at-other-countries-accepting-upi-for-cross-border-transaction-389694-2023-07-14>.

⁵²<https://www.livemint.com/technology/tech-news/japan-seriously-looking-at-joining-indias-upi-payments-system-11684487209053.html>.

⁵³<https://www.forbesindia.com/article/take-one-big-story-of-the-day/ondc-is-indias-next-big-bet-after-upi/85073/1>.

⁵⁴<https://ondc.org/blog/indian-government-integrates-msme-global-mart-into-ondc/>.

⁵⁵https://www3.weforum.org/docs/WEF_Earning_Digital_Trust_2022.pdf.

In an interconnected ecosystem, security issues must thus be prioritised to build trust. Any government building or adopting such digital stacks must feature a robust cybersecurity and data protection framework and offer insurance to mitigate other types of cyber risk.

Other challenges that may arise could be a lack of digital literacy and cyber awareness. Inadequate infrastructure, such as poor Internet connectivity and limited access to supporting

mobile devices; inequalities, such as those characterised by the digital divide across gender, income and social groups and a higher tolerance for criminal activity could negatively influence adoption rates and trust. Because of its own success, India is in a unique position to lead the development of reliable technological solutions for the world over the coming years. Emerging economies will especially benefit from India's digital diplomacy in the future, thereby strengthening India's position as a key player in the digital era.

Digital capabilities as services to the world

At the time of liberalisation in 1991, it would have been difficult to believe that India would account for nearly 5 percent of service exports globally, but we are witnessing this today.⁵⁶ Fast forward 30 years to 2021, and India has created a niche position for itself as the service hub of the world.

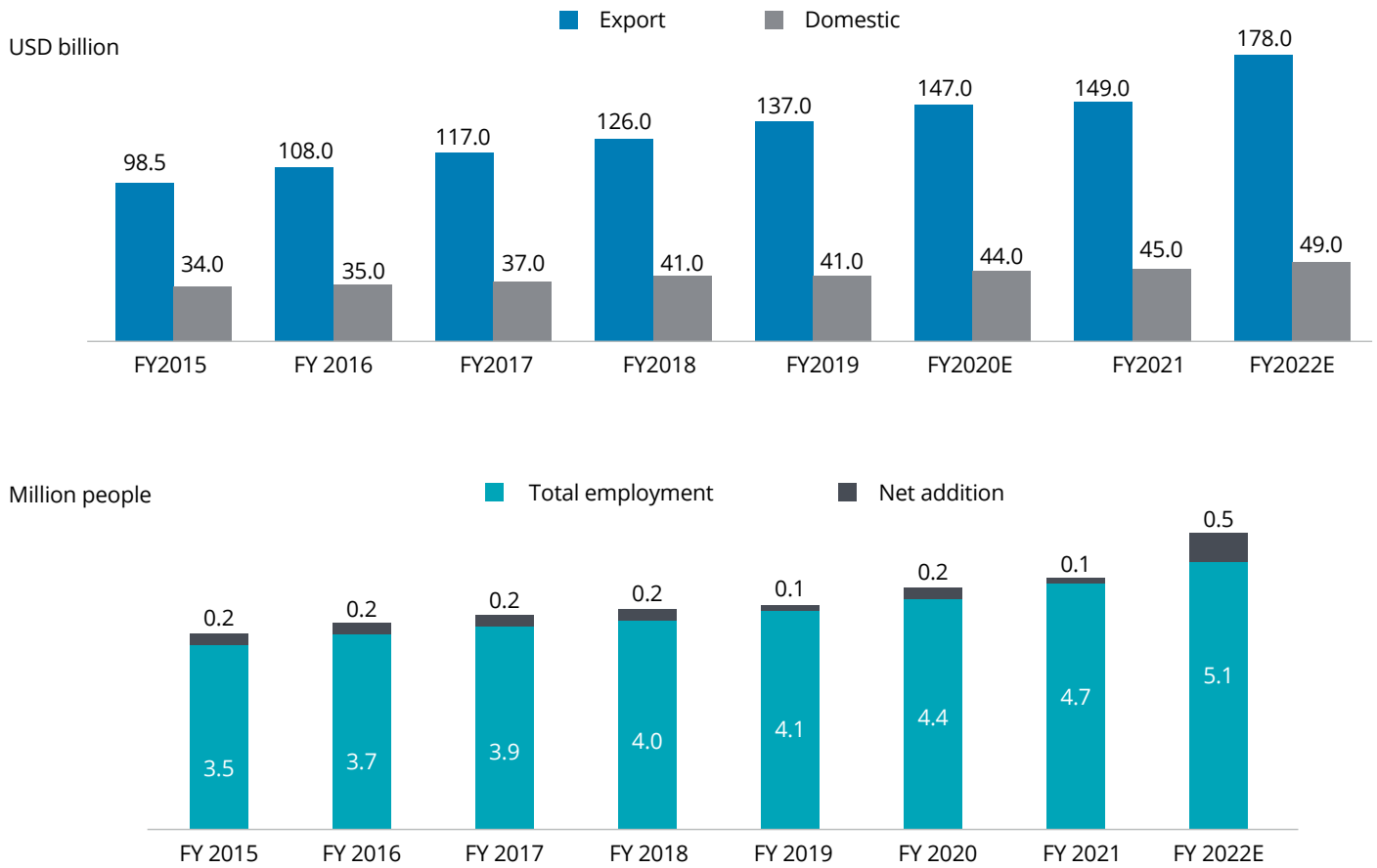
The globalisation of enterprises, the Internet boom of the 1990s, and the digital revolution, which has been ongoing since early 2000, have propelled India's technological services industry. About two-thirds of the market is export-oriented, with contributions from the IT sector being the most significant (see Figure 18).

What started as back offices have now turned into centres of excellence powered by global capability centres (GCCs) that now

offer global clients various high-end and critical solutions across specialisations, such as IT, accounting and legal. As demand for services in management consulting and data analytics is rising, so is the contribution to exports and employment. The digital drive in India is attracting foreign investment with several MNCs considering India for R&D in several IT-led sectors.

⁵⁶<https://www.moneycontrol.com/news/business/markets/indias-services-sector-exports-defy-global-slowdown-grab-higher-global-market-share-morgan-stanley-10653701.html>.

Figure 18. Market size and employment of the IT and ITeS sector in India



Source: NASSCOM Strategic Review report.

GCCs will lead the way

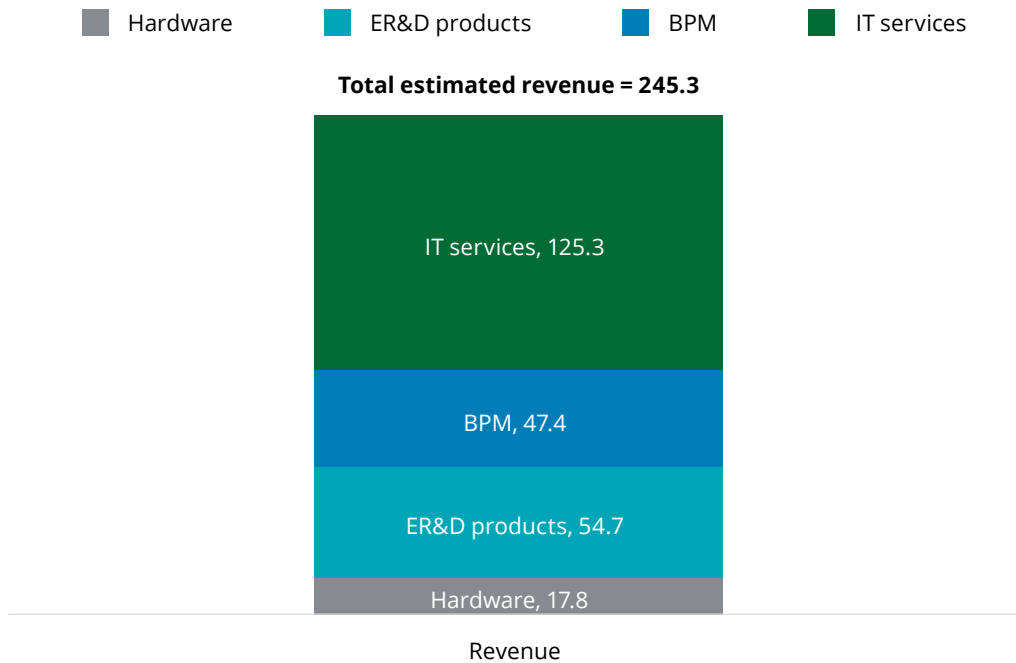
GCCs in India have seen a boom in not only IT-related but also non-IT-related services, with the latter generating one-quarter of all IT-related revenue. With their revenue comprising 1 percent of India’s GDP, the number of GCCs has increased by approximately 60 percent since 2015 and is expected to exceed 1,900 by 2025.⁵⁷ This will yield a US\$ 250 billion market share and

create employment for up to 13 million individuals.⁵⁸ By 2035, there is likely to be more than 2,000 new GCCs in India providing a myriad of services including research, consulting and advisory services in addition to conceptualisation and design using cutting-edge technologies.

⁵⁷<https://nasscom.in/knowledge-center/publications/gcc-40-india-redefining-globalization-blueprint>.

⁵⁸<https://www2.deloitte.com/content/dam/Deloitte/in/Documents/Consulting/in-consulting-gcc-value-proposition-for-india2-noexp.pdf>.

Figure 19. Estimated revenue from Indian technology market (in US\$ billion, FY2023 estimates)



Source: NASSCOM strategic review report, 2023

Although, IT services have been the greatest contributors to technology sector revenue (i.e., US\$ 125.3 billion), the contribution of engineering and research expertise in Indian GCCs is also notable (refer to Figure 19). It is expected to approach a quarter of India's total revenue in 2023 and sharply increase over the next few years.

Two factors will drive the potential of GCCs:

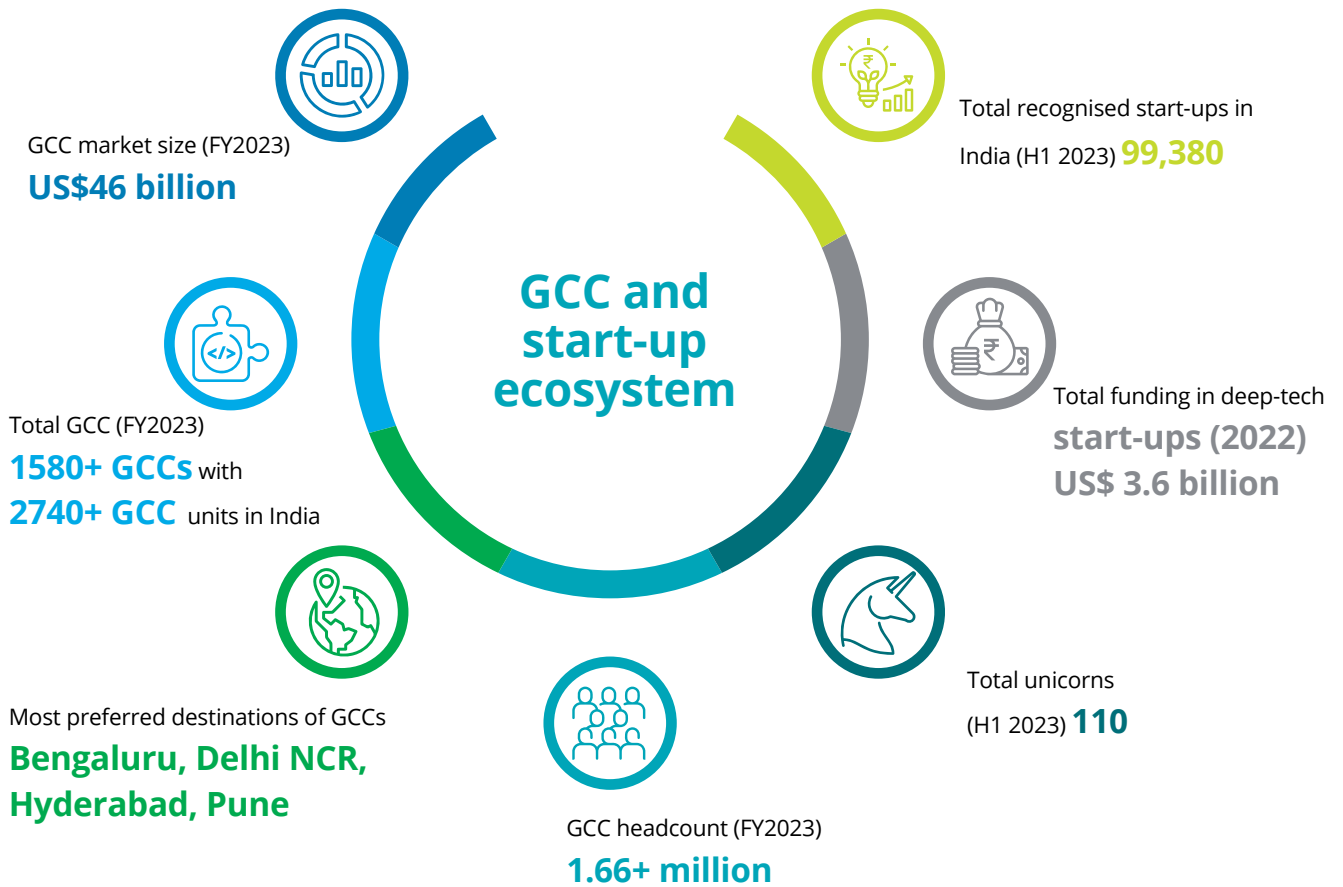
- **Favourable IT infrastructure, ecosystem and policies:** Synergies with parent organisations, ecosystem partners and over 15 incubators and 40 accelerators as well as multiple

partner programmes will drive partnerships with various stakeholders in global operations and innovation. Government initiatives, such as Digital India, national fibre optics (BharatNet) and the new National Education Policy 2020 (which aims to include AI in the curriculum) will create a favourable space for global organisations to set up their GCCs.

- **Robust innovation and tech start-up network:** India's innovation and start-ups will help reduce operational costs, increase customer and user reach and expand and even create markets catering to less serviced areas.



Figure 20. Ecosystem of GCCs and technology start-up network



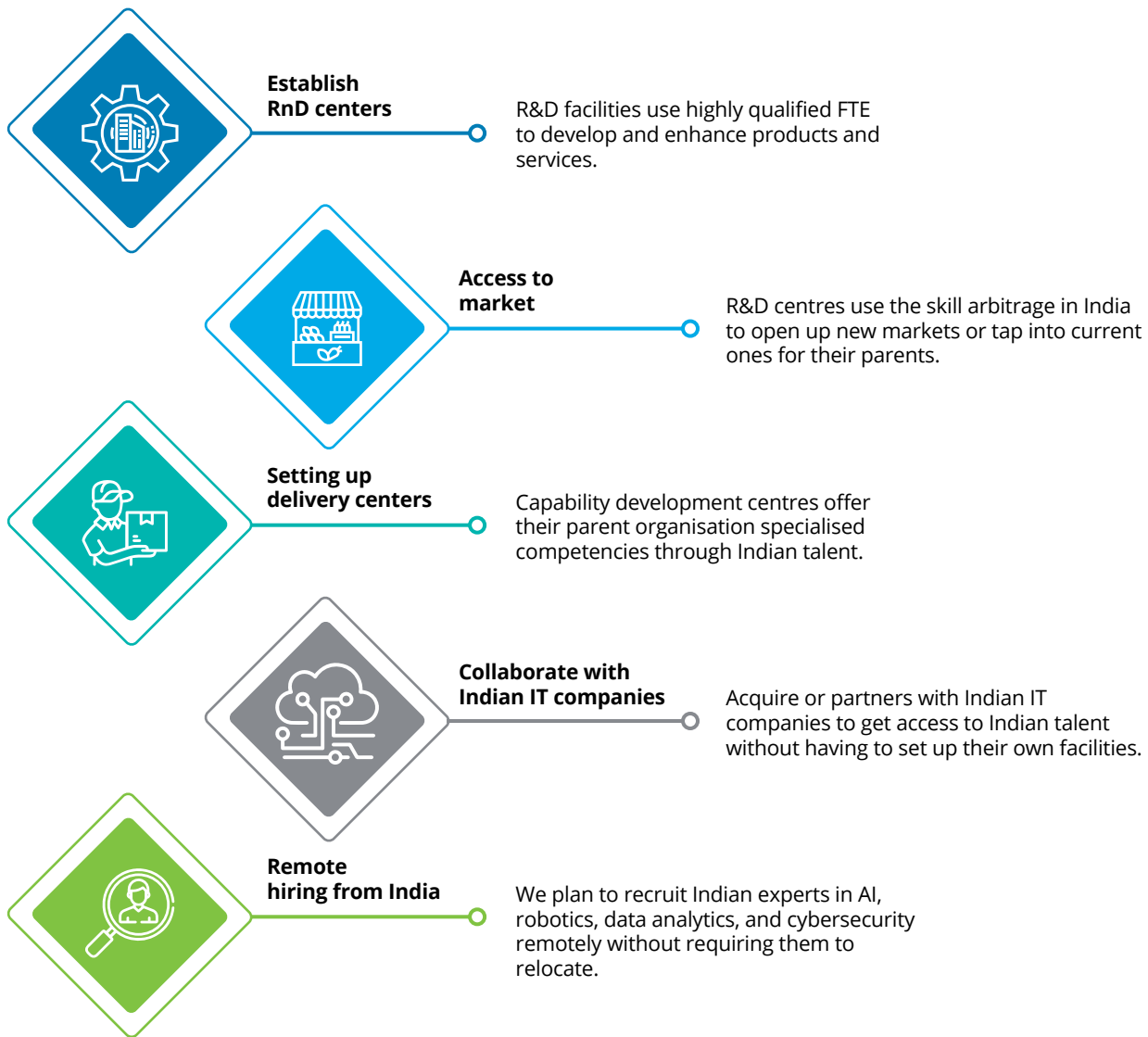
Source: Department for Promotion of Industry and Internal Trade; NASSCOM Startup and GCC4.0 report; Inc42 Unicorn report

The way forward will need a shift in the mindset from a cost-savings to a capability-development perspective.

With technology disrupting market dynamics and competition, India's GCCs' selling proposition will shift away from the safe harbour of cost savings to competence and value creation. GCCs

will incorporate emerging technologies, such as AI and ML to build capability development and innovation and R&D centres (Figure 21). This way, GCCs will enhance agility and advance India's industry to the high-value-added tasks of data analytics, conceptualisation and design.

Figure 21. Capabilities that can move GCCs up in the value chain



Source: GCC Value Proposition Report, Deloitte.

Building a skilled workforce for the future

For India to become a developed country by 2047, it must shatter the historic shibboleths of skilling. We must equip our talent strategically to actualise the potential of GCCs and digital transformation.

Addressing the skilling gap will be critical, and India will require a strong foundation of digital talent force. According to NASSCOM's estimation, there is a gap of approximately 6 million between the demand and supply of digital talent among eight countries, including the US, China, India and parts of Europe.⁵⁹ For India, talent is going to be the biggest obstacle for its IT sector to thrive, the lack of which may create barriers to rapid innovation and the adoption of cutting-edge technologies. India will need to not only improve digital and data literacy but also instil critical thinking and emotional intelligence as desirable skills for its population by 2030.⁶⁰

Be like water: Curriculum scope to attend to the “multiple futures” of business

India must transition away from traditional academics to more agile and dynamic training models by focusing on generating a skilled workforce that is more employable by providing the following resources:

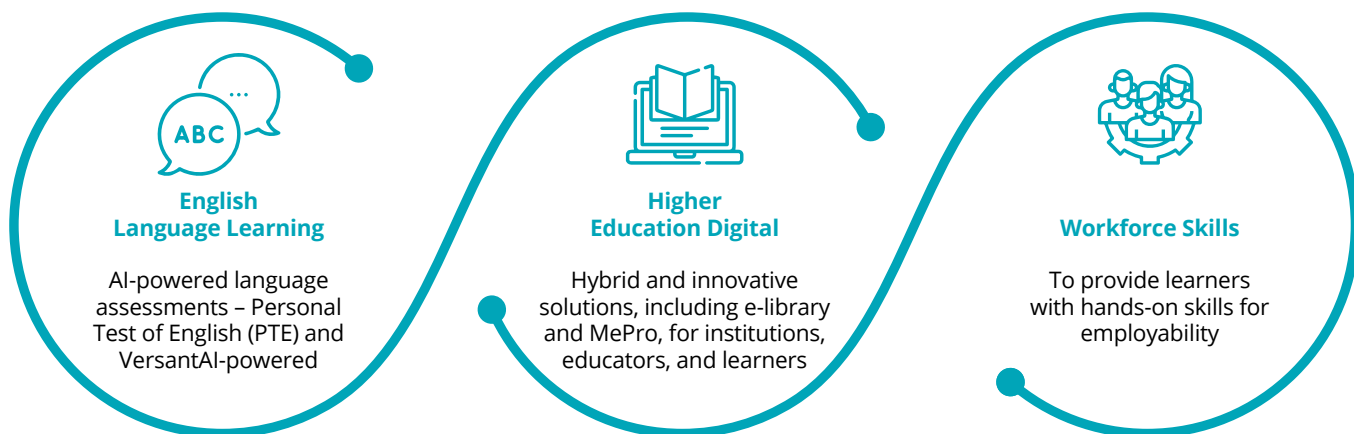
- **Vocational training to freshers out of school**, tapping into resources from Tier 2 and Tier 3 cities and reskilling the

non-technical talent pool with the required skills. This will encourage more women to join the workforce.⁶¹ The National Education Policy (NEP) 2020 will also provide an overarching framework that should encourage at least 50 percent of all learners to attain a vocational education by 2025.⁶²

- **A strong academia–industry ecosystem** that can drive innovation and future-ready business models. Although the industry will bring an outside-in view of the skills and personality development required to survive and thrive in a business ecosystem, enterprises will have direct access to the talent trained to meet their needs.⁶³
- **Non-technical skill development:** Workplaces and requirements will change, and the abilities needed to succeed in the workforce will differ from what we know today. Soft skills, such as communication and emotional intelligence, and the ability to tackle increasing intercultural nuances and disruptive technologies will go a long way in improving a person's employability in non-technical advisory and consulting service focused positions.

Figure 22. Thrust in soft skills⁶⁴

Global powerhouse of learning focused on education, employability, and global mobility



Source: Pearson India.

Please note that businesses will have “multiple futures” to contend with; therefore, early intervention in upskilling and reskilling will be important, as illustrated in Figure 22.

⁵⁹<https://community.nasscom.in/communities/emerging-tech/war-digital-talent-india-can-emerge-global-hub-it>.

⁶⁰https://do3n1uzkew47z.cloudfront.net/siteassets/pdf/ISR_Report_2023.pdf.

⁶¹<https://www.indiabudget.gov.in/economicssurvey/>.

⁶²<https://pib.gov.in/PressReleaselframePage.aspx?PRID=188494101.html>.

⁶³<https://community.nasscom.in/communities/emerging-tech/war-digital-talent-india-can-emerge-global-hub-it>.

⁶⁴<https://www.cii.in/PublicationDetail.aspx?enc=XF2FtOKR1TnDFQ/BVpAZp2KoWPo5sapXv7+q7UwuUFs=>.

Abbreviations and Acronyms

Abbreviation	Expansion
AA	Account Aggregator
ABDM	Ayushman Bharat Digital Mission
AIoT	Artificial Intelligence of Things
BHIM	Bharat Interface for Money
BPaaS	Business Process as a Service
BPM	Business Process Management
Co-bot	Collaborative Robot
CoE	Centres of Excellence
CSP	Communication Service Providers
DBT	Direct Benefit Transfer
DPG	Digital Public Goods
DPI	Digital Public Infrastructure
EDA	Electronic Design Automation
ER&D	Engineering, Research, and Development
FTE	Full Time Equivalent
GCC	Global capability centers
GER	Gross Enrollment Ratio
IaaS	Infrastructure as a Service
ITU	International Telecommunication Union
IUDX	India Urban Data Exchange
JV	Joint Venture
LLM	Large Language Models

Abbreviation	Expansion
MeitY	Ministry of Electronics and Information Technology
MOSFET	Metal oxide semiconductor field-effect transistor
NEP	National Education Programme/Policy
NIC	National Informatics Centre
NLP	Natural Language Processing
NOFN	National Optical Fibre Network
NREGA	National Rural Employment Guarantee Act
OEM	Original Equipment Manufacturer
ONDC	Open Network Digital Commerce
OSAT	Outsourced Semiconductor Assembly and Test
PaaS	Platform as a Service
RFID	Radio Frequency Identification
SaaS	Software as a Service
SASE	Secure Access Service Edge
SATCOM	Satellite Communications
SoC	System-on-Chip
UAV	Unmanned Aerial Vehicle
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UPI	Unified Payments Interface
XR	Extended Reality

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The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering Industry, Government, and civil society, through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, with around 9,000 members from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 300,000 enterprises from 286 national and regional sectoral industry bodies.

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As India strategizes for the next 25 years to India@100, Indian industry must scale the competitiveness ladder to drive growth. It must also internalize the tenets of sustainability and climate action and accelerate its globalisation journey for leadership in a changing world. The role played by Indian industry will be central to the country's progress and success as a nation. CII, with the Theme for 2023-24 as 'Towards a Competitive and Sustainable India@100: Growth, Inclusiveness, Globalisation, Building Trust' has prioritized 6 action themes that will catalyze the journey of the country towards the vision of India@100.

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