CBRE

Manufacturing Manual

MODERNISING INDIA'S INDUSTRIAL LANDSCAPE

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Executive Summary

In recent years, the global manufacturing landscape has been shaped by a series of unprecedented disruptions, prompting decision-makers across industries to revisit foundational strategies. This recalibration has led to a reimagining of real estate asset classes, driven by heightened focus on the **triad** of ***technology, sustainability,*** *and* ***human inclusivity.***

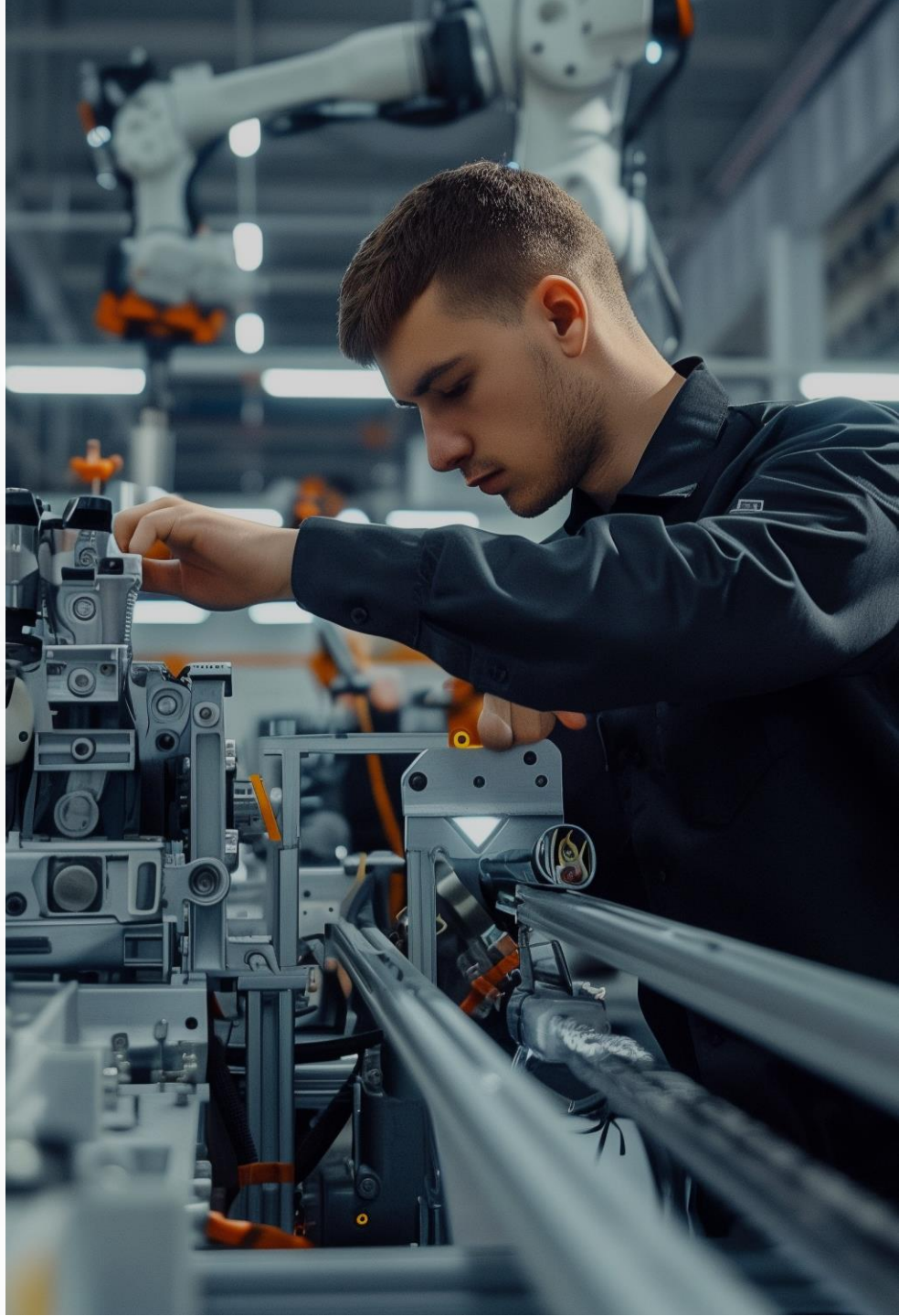
Within the industrial sector, supply chain realignment has accelerated manufacturing expansion across Southeast Asia, with Vietnam, Indonesia, and Thailand gaining prominence. India, already on a trajectory to become a global manufacturing powerhouse, has further strengthened its position, not only as a production but also as a strategic trans-shipment hub. This ascent is anchored by the country's inherent advantages: **a youthful and skilled workforce, cost-effective labour, robust digital infrastructure,** and **progressive policy frameworks.**

As global manufacturing evolves, the emphasis is shifting from automation-led efficiency to **symbiotic manufacturing**—a paradigm that integrates advanced technologies with circular economy principles and human-centric innovation. To remain competitive, India must transition from legacy industrial models to next-generation industrial parks that embody this triad, involving smart infrastructure, sustainable design, and inclusive development.

This report aims to outline **strategic recommendations** for key stakeholders across the **industrial** sector – developers, government bodies, and institutional investors, offering actionable insights, including:

- **Smart infrastructure provisioning,** constituted by 'plug-and-play' utilities, automation-ready layouts, and digital connectivity.
- **Sustainability integration** through circular economy models, renewable energy adoption, and ESG-compliant frameworks.
- **Human development** through training hubs, inclusive amenities, and collaborative zones for human-machine synergy.
- **Governance and policy support** enabling adaptive management, streamlined approvals, and financial incentives.

Through global and national case studies, the report demonstrates how collaborative efforts can unlock scalable, resilient, and future-ready industrial ecosystems. Ultimately, **infrastructure modernisation** is not just a facilitator—it is a strategic enabler that will determine India's ability to lead in the evolving global industrial landscape.



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India Forging as a Prominent Manufacturing Powerhouse

India Presents a Compelling Alternative to Traditional Manufacturing Hubs

As companies recalibrate their supply chains in pursuit of resilience, flexibility, and geopolitical balance, key Southeast Asian economies such as Vietnam, Thailand, and Indonesia have rapidly emerged as preferred destinations for nearshoring and offshoring. As illustrated in **Figure 2.1**, manufacturing gross value added (GVA) across these emerging economies has shown a consistent upward trajectory since 2020, emphasising the momentum of this realignment. Amidst this shift, India has not only positioned itself as a key beneficiary but carved out its name as a strategic frontrunner. Rather than passively adapting to global trends, the country has proactively leveraged its **demographic dividend, the policy's dynamism - supported by the state government's tailored incentives to attract investment, and expanding domestic market** presenting itself as a compelling alternative to traditional manufacturing hubs such as China, Japan, and South Korea.

Structural reforms, strategic partnerships, and accelerated infrastructure development have cultivated an ecosystem primed for India's industrial growth. This is reflected in its manufacturing sector's sustained GDP contributions and consistently growing foreign direct investment (FDI), significantly bolstered by the production-linked incentive (PLI) scheme. This continued investor confidence is duly supported by the country's extensive network of industrial parks, special economic zones (SEZs), and critical infrastructure initiatives. In fact, despite evolving international trade policies, including higher U.S. tariffs on select Indian exports, key manufacturing indicators suggest long-term resilience in the sector. These changes also present an opportunity for diversification and may drive a shift toward domestic or alternative markets, prompting the emergence of new logistics hubs.

17%[1] contribution by the manufacturing sector to India's overall GDP

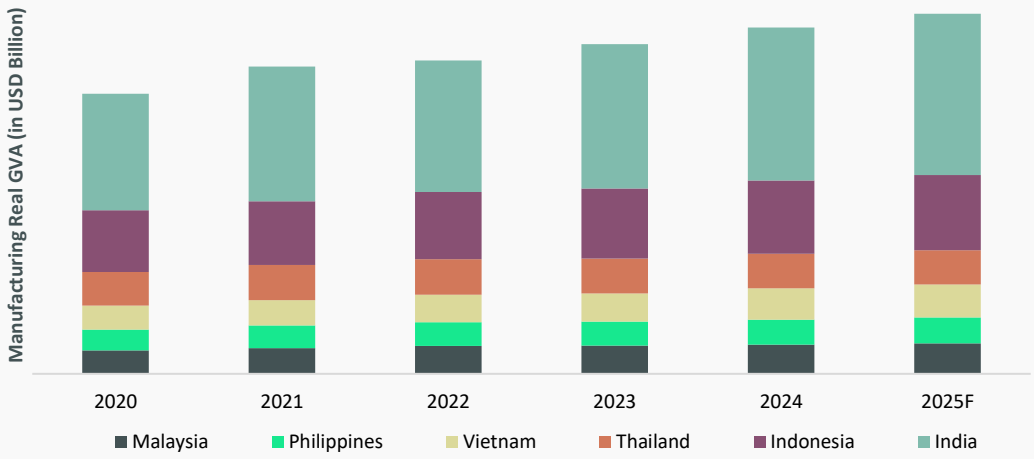
USD 1.2 trillion[2] outlay through strategic infrastructure initiative Gati Sakti

Sunrise sectors[2] include renewable energy, EVs, semiconductors, electronics, pharmaceuticals & food processing

~3,800 locations, spanning **~4.68** lakh hectares[1] - vast network of Industrial Parks and SEZs

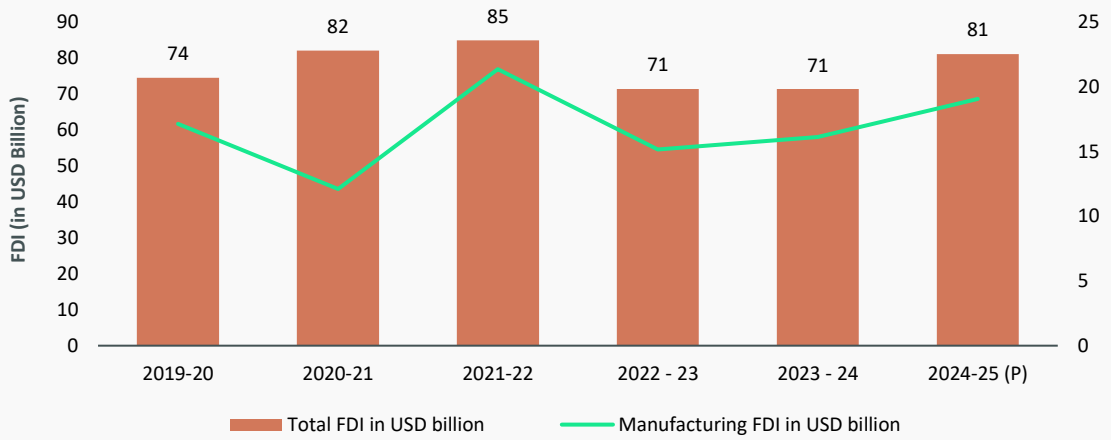
Source: 1. Department for Promotion of Industry and Internal Trade (DPIIT); 2. Invest India; CBRE Research Q3 2025

Figure 2.1. Manufacturing real gross value added (GVA) across key Asian competitors (2020-2024)



Source: Oxford Economics, July 2025; CBRE Research Q3 2025

Figure 2.2. India's yearly total and manufacturing sector FDI inflows (2019-20 to 2024-25)



Source: The Department for Promotion of Industry and Internal Trade (DPIIT), GoI; CBRE Research Q3 2025

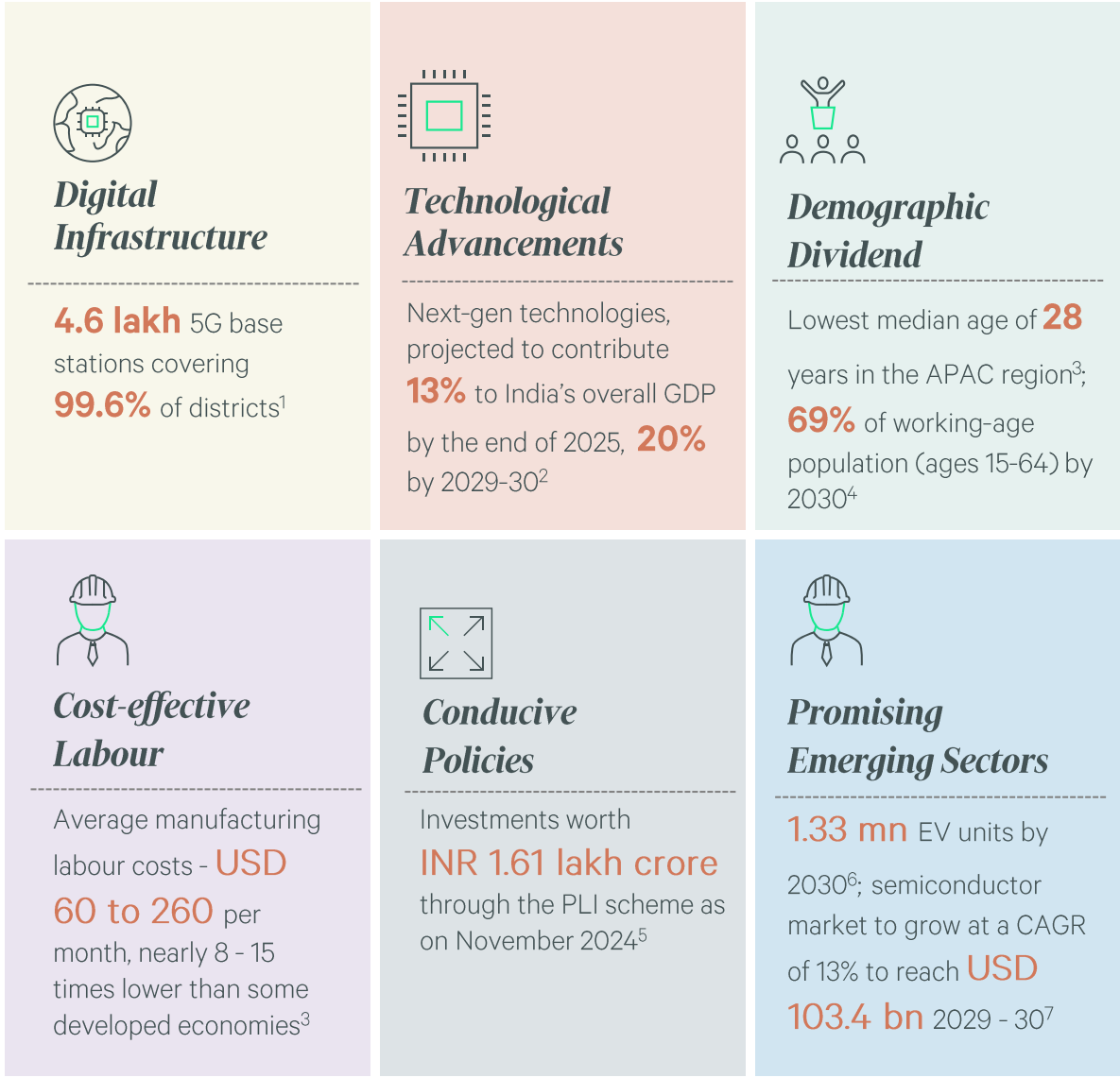
India Presents a Compelling Alternative to Traditional Manufacturing Hubs

India's unique attributes, which include evolving digital infrastructure, a skilled and adaptable workforce, and a compelling narrative of robust domestic consumption, combined with the strategic realignment of global supply chains, underpinned by privatisation and upgradation of ports, create an exceptional momentum for advancement.

The country's ambition to establish itself as a key manufacturing and transshipment hub acts as a driving force for established industries, ranging from pharmaceuticals and electronics to automotive manufacturing to harness the combined strengths of technology, human collaboration, and sustainability.

In the backdrop of these developments, CBRE India Research's previous report, "Fortifying India's I&L Landscape with a New Manufacturing Growth Formula," comprehensively examines the catalysts shaping the industrial and manufacturing sectors. While it provides an extensive analysis of these dynamics; this report will briefly highlight the key tailwinds for the manufacturing sector.

Figure 2.3. Key growth drivers for India's manufacturing sector



Source: 1. Department of Telecommunication, December 2024; 2. Ministry of Electronics and Information Technology: Estimation and Measurement of India's Digital Economy Report, January 2025; 3. Advantage India: What makes the country a competitive global manufacturing powerhouse, PwC, June 2023; 4. Department of Economic and Social Affairs, United Nations, July 2022; CBRE research, Q3, 2025; 5. Ministry of Commerce & Industry, March 2025; 6. India's EV Market: Trends and Future Prospects – S&P Global, March 2025; 7. Indian Electronics and Semiconductor Association (IESA)

India Forging as a Prominent Manufacturing Powerhouse

In preparation for the next industrial revolution, it is crucial to assess the current standing of major economies and India. CBRE Research analysed indices focused on digitisation, technological innovation, sustainable practices, and talent availability to evaluate this positioning. This analysis revealed three distinct archetypes that precisely elaborate on the competitive positioning of key countries. Understanding these archetypes provides a framework for comprehending how different nations, including India, are prepared for the future of manufacturing. The three archetypes are as follows:

1

'Pioneers'

These nations are early adopters, heavily investing in research & development (R&D) and quickly piloting new technologies. They lead in sustainable practices, digital adoption, and upskilling their workforce for advanced automation and human-robotics interaction.

2

'Tactical Strategists'

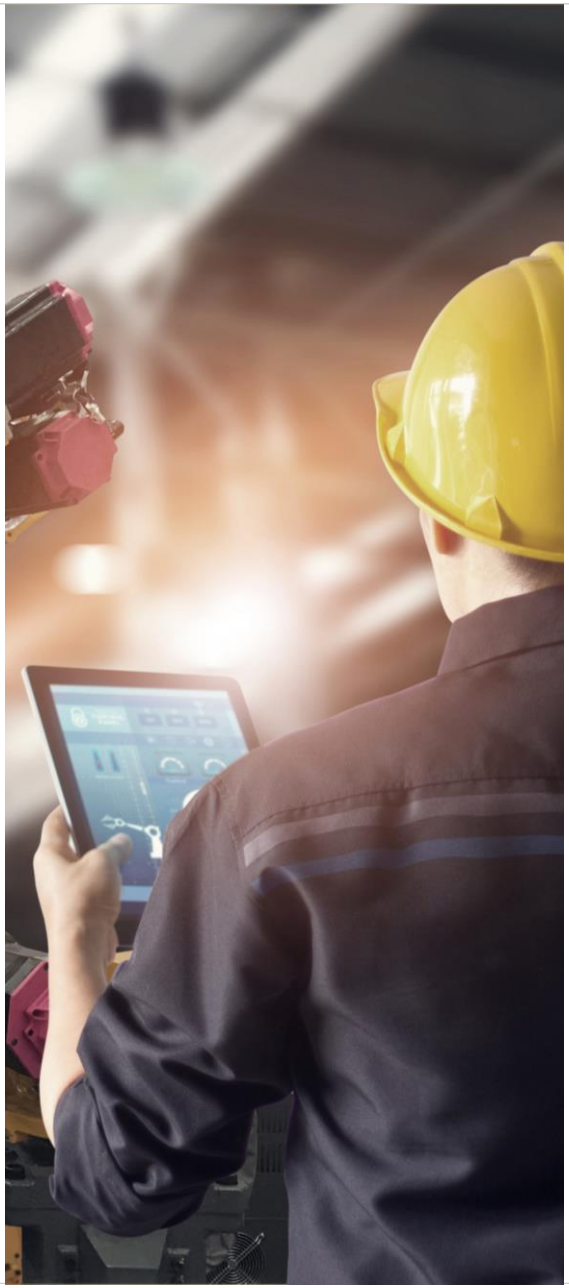
These nations take a deliberate, industry-focused approach, prioritising technology adoption for competitive advantage. They integrate eco-efficiency into manufacturing processes and highlight human oversight in complex automated environments.

3

'Agile Adaptors'

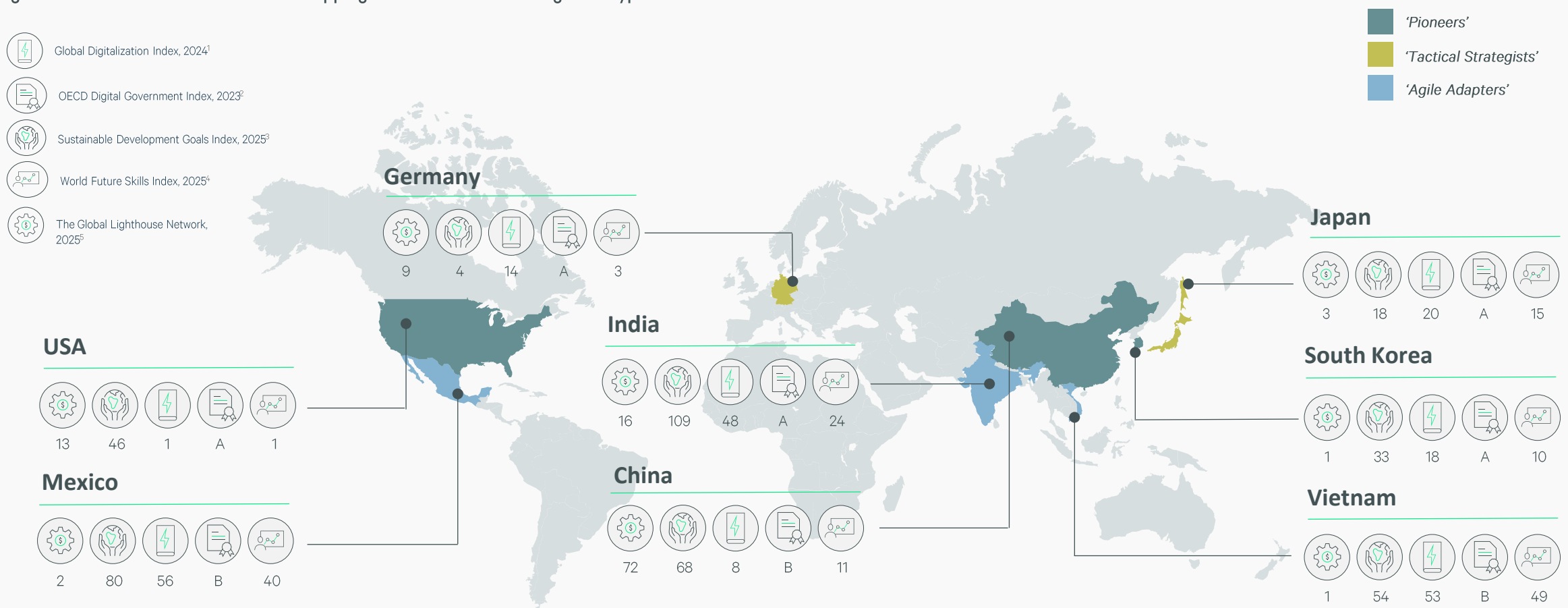
These nations show remarkable agility, often leapfrogging older infrastructure with decentralised, market-driven adoption. Their sustainability efforts often stem from grassroots innovation as they rapidly grow their digital literacy to empower a diverse workforce.

In the next slide, CBRE Research aims to classify a few major economies into these three archetypes basis a few key indicators / indices relevant for the evolution of industrial parks.



Positioned as an **'Agile Adaptor'** in the global industrial landscape, India is leveraging its youthful workforce, digital growth, and sustainability commitments to drive modernisation in manufacturing.

Figure 2.4. Global industrial readiness: Mapping the three manufacturing archetypes

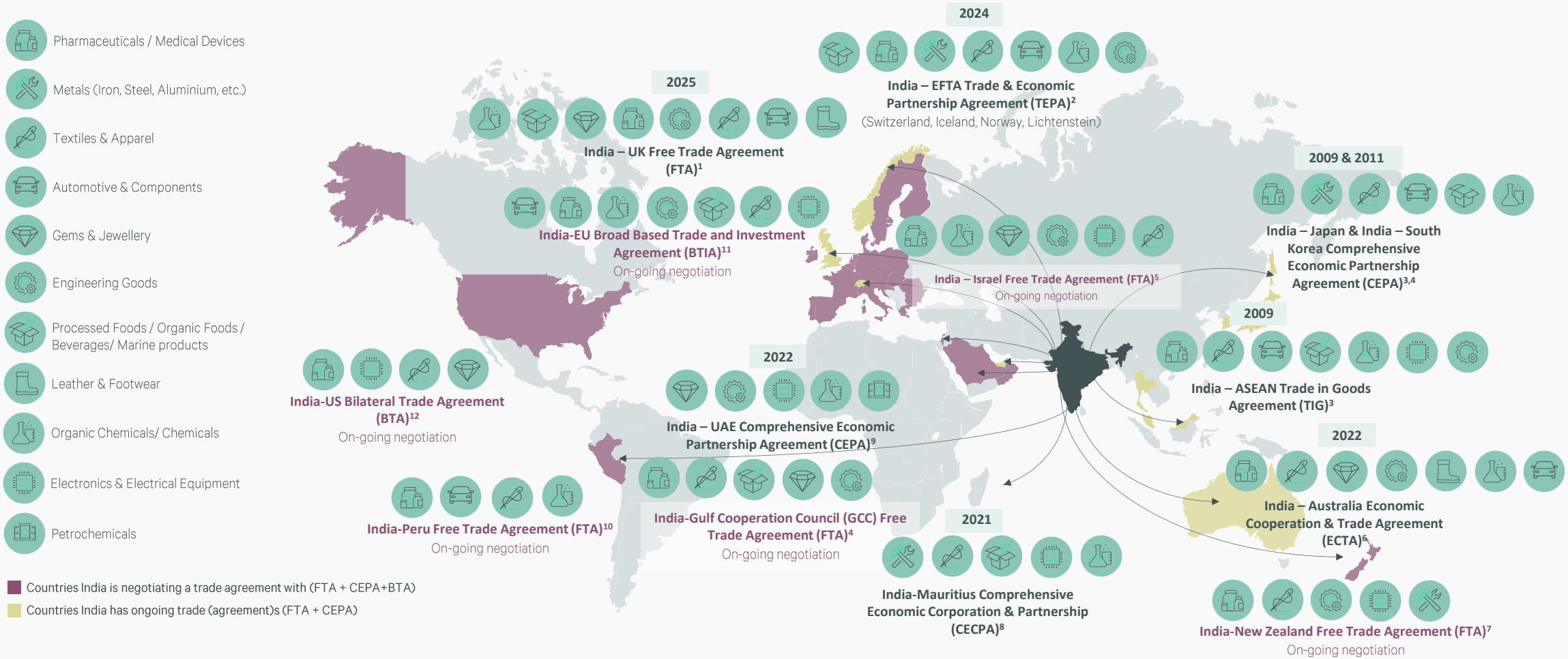


Source: 1. Created by Huawei and International Data Corporation (IDC), Global Digitalization Index (GDI) 2024 measures the digital transformation of 77 countries, representing 93% of the world's GDP. It assesses a country's digital maturity across four key pillars: ubiquitous connectivity, digital foundation, green energy, and a supportive policy and ecosystem; 2. OECD Digital Government Index (DGI) 2023 by Organization for Economic Co-operation and Development (OECD) is a measurement tool that assesses how effectively governments are using digital technologies and data to transform their public sectors; 3. The Sustainable Development Goals Index reviews progress made each year on the sustainable development goals since their adoption in 2015 by the 193 UN Member States, Sustainable Development Report, United Nations, 2025; 4. Published by Quacquarelli Symonds (QS), the QS World Future Skills Index evaluates how well countries are equipped to meet the evolving demands of the international job market, focusing on areas such as digital skills, AI, and green technologies, QS Future Skill Index, 2025; 5. In the World Economic Forum's Global Lighthouse Network, a "Lighthouse" is a manufacturing site that demonstrates global leadership by successfully adopting and scaling Fourth Industrial Revolution (4IR) technologies such as AI, IoT, and robotics to achieve significant improvements in financial, operational, and environmental performance, The Global Lighthouse Network-World Economic Forum, 2025; CBRE Research, Q3 2025

Strategic Foreign Trade Agreements (FTAs) Positioning India as a Global Manufacturing Hub

India's on-going and future trade agreements with major global economies, detailed in **Figure 2.5,** offer significant diversification opportunities to further boost its manufacturing standing across key industries.

Figure 2.5. Mapping manufacturing sectors benefitting from India's trade agreements with key global economies

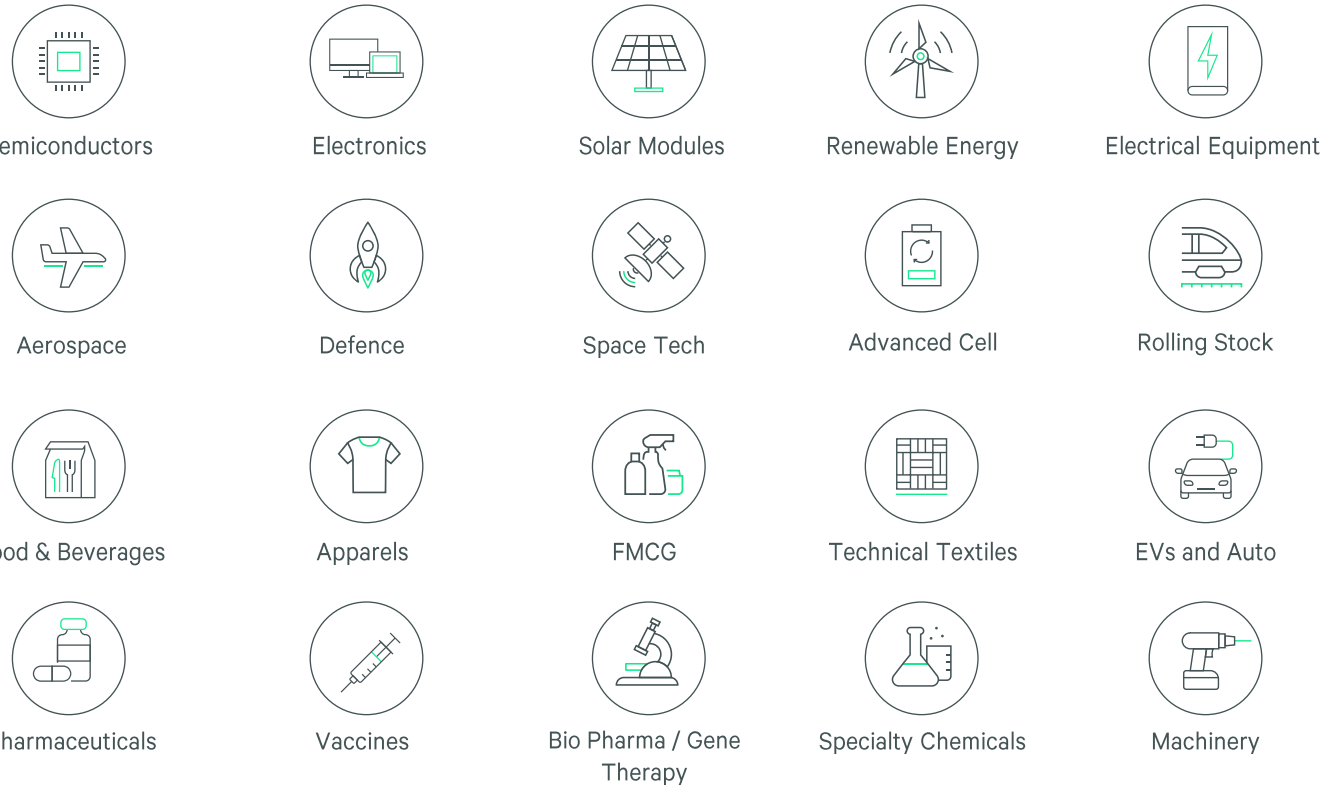


Source: 1. Ministry of Commerce & Industry, GoI, May 2025; 2. Ministry of Commerce & Industry, GoI, March 2024; 3. Indian Trade Portal, Ministry of Commerce & Industry, GoI; 4. Ministry of External Affairs (MEA), GoI; 5. Ministry of Commerce & Industry, GoI, December 2021; 6. Ministry of Commerce & Industry, GoI, December 2022; 7. New Zealand Foreign Affairs & Trade, New Zealand Government; 8. Ministry of Commerce & Industry, GoI, March 2021; 9. UAE-INDIA CEPA Council; 10. Confederation of Indian Industry (CII), June 2025; 11. Media article, March 2025; 12. Media article, July 2025; CBRE Research, Q3 2025

Manufacturing Sectors Moulding India's Industrial Narrative

While legacy sectors such as **pharmaceuticals, chemicals, building materials, earth-moving manufacturers, and food processing, etc.,** continue to anchor the industrial ecosystem, emerging industries such as **EVs, electronics & electrical, and defence** are rapidly gaining traction, marking a clear shift in the industrial landscape. As these sectors evolve, the design of industrial parks must move beyond traditional parameters of cost and location. To support this transformation, infrastructure must **cater to highly skilled talent, enable end-to-end value chain integration, and accommodate larger, more flexible land parcels.** Moreover, the rise of smart manufacturing technologies require a robust digital and physical backbone. States are responding with initiatives such as Multi-Modal Logistics Parks and sector-specific industrial parks to enhance supply chain efficiency, boost output, and attract investment.

Figure 2.6: Key sectors that are expected to drive the Indian manufacturing sector



Source: CBRE Research, Q3 2025

Tracing the foreign direct investment (FDI) influx across India's prominent industrial sectors

- Since 2010, investment has shifted to new age sectors such as electrical and electronics, along with legacy sectors such as food processing, and metallurgy.
- Between 2015 and 2024*, cumulative investment volumes have grown nearly **11 times** compared to the period from liberalisation (1992) to 2014.
- Sectors such as chemicals, metallurgy, electrical & electronics, building materials, and automobile & ancillary witnessed robust infusion, collectively accounting for **nearly 75% of total investment volume during the 2015–2024* period.**
- Even in the most recent five-year window, these sectors maintained a stronghold, contributing **more than 60% of all investments.**
- Between 2020 and 2024*, investment volumes in food processing, cement, and metallurgy **grew by 1.4x to 1.8x** compared to the previous five-year period, underscoring their continued relevance in the country's industrial growth story.
- In terms of state-wise activity**, Maharashtra and Gujarat** led the way in foreign capital infusion in the manufacturing sector, together accounting for approximately 40% of total investment from 2020 to 2024. Apart from these two states, a wider spatial spread is evident with Madhya Pradesh, Rajasthan, Uttar Pradesh, Andhra Pradesh, Odisha also emerging as new contenders.

Source: Department for Promotion of Industry and Internal Trade, July 2025; *For 2024, data available as of August 2024

3

Understanding the Past, the Present and the Future of Manufacturing

Across the world, manufacturers are not only embracing the automation-driven efficiencies of Industry 4.0, but also accelerating their adaptation to its core tenets. Concurrently, the global manufacturing horizon is already revealing the contours of the next industrial revolution: Industry 5.0-Symbiotic Manufacturing. This new paradigm seamlessly integrates advanced technologies, environmentally responsible practices, and human-centric innovation, marking a transformation from linear, siloed operations to interconnected, adaptive ecosystems. To provide a clearer understanding of this evolution, CBRE Research has mapped the defining characteristics of each industrial revolution. Figure 3.1 illustrates this progression from mechanisation to symbiosis, highlighting the pivotal shifts in each era and tracing the consequent transformation of the industrial park infrastructure.

Figure 3.1. Evolution of industrial parks through various stages of Industrial Revolution (18th century to 2025 and beyond)

Evolution of industrial park infrastructure	Rudimentary factories and fragmented mills located near water bodies and coal mines	Large-scale manufacturing zones with rail connectivity and power grids	Export Processing Zones (EPZs), Special Economic Zones (SEZs), and sector-specific clusters	Digitally enabled parks with IoT, automation-ready layouts, and ESG compliance	Next-generation parks with circular economy models, human–AI collaboration zones, and regenerative design
Tracing the development of triad across the industrial revolution	**1784-1869** Industry 1.0 **Mechanisation Era**	**1870-1968** Industry 2.0 **Electrification & Mass Production**	**1969-1999** Industry 3.0 **Automation & IT Integration**	**2000 onwards** Industry 4.0 **Smart & Connected Manufacturing**	**2025 and beyond** Industry 5.0 **Human-machine collaboration**
	▸ Profound shift in technological innovation, mechanisation of production, refinement of steam engine[1], invention of spinning jenny[2] ▸ Coal – dominant energy source, coal mining caused deforestation, land subsidence and air pollution leading to environmental degradation ▸ Mass migration to cities lead to overcrowded slums with poor sanitation, low wages for unskilled workers	▸ Widespread adoption of electricity, mass production of cars through the assembly line, boom in steel production supporting skyscrapers, railroads, etc. ▸ Resource exploitation and environmental degradation driven by fossil fuel dependency and unchecked industrialisation ▸ Progress in living standards and social reforms, improved access to education, delayed development in developing nations owing to geopolitical events	▸ Digital revolution emphasising automation and IT, shift in manufacturing processes, widespread internet adoption ▸ Growing environmental awareness, biotech innovations - this era laid the groundwork for sustainable industrial development ▸ Improved education, communication, and quality of life, creation of new jobs in IT, reduction in manufacturing jobs owing to automation	▸ Transformation of global business operations through cloud computing, big data analytics, additive manufacturing (3D printing), AI, and IoT ▸ Sustainable development goals, corporate shifts towards net-zero emissions, integration of renewable energy sources, inception of circular economy models ▸ Digital literacy crucial, prioritising skill development, inception of human-machine collaboration	▸ Advanced technologies fostering human-machine collaboration, cognitive manufacturing, blockchain models ▸ Sustainability - a core pillar, regulatory frameworks and corporate commitments influenced with global agendas ▸ Technology augmenting human roles fostering well-being, creativity, and social inequality in the workforce

FOCUS SECTORS Technology Sustainability Human Inclusivity

Source: The dawn of Industry 5.0, Rothschild & Co., November 2024; CBRE Research Q3 2025

Manufacturing Reimagined: A Sustainable, Human-Centric Future

The global manufacturing and industrial landscape is transforming due to a blend of strict climate mandates, advanced technologies, and a shift towards human-centric operations. The 2015 Paris Agreement's goal of achieving net-zero emissions by 2050 [1] places mounting pressure on industries to embrace sustainable practices, particularly as the industrial sector alone accounted for 38% of global greenhouse gas (GHG) emissions in 2022, a figure that also includes emissions from the electricity and heat it consumes. [2]

Simultaneously, the emergence of Industry 5.0 highlights the importance of human-machine collaboration, prioritising workforce wellbeing over the automation-centric approach of Industry 4.0. These global trends present a dual nature of challenges and opportunities for nations navigating this new industrial landscape.

Figure 3.2: Transition from Industry 4.0 to Industry 5.0

Remarkably, a staggering 93% of Indian manufacturers are actively embracing Industry 5.0 as a catalyst for driving sustainability, anticipating a remarkable 6.42% growth in revenue over the next two years[3] . However, achieving these ambitious targets and moving into the next phase requires a comprehensive overhaul of the supporting infrastructure. Modern facilities that integrate the fabric of social-centric principles into the manufacturing hierarchy are essential to create a resilient industrial ecosystem.

Source: 1. United Nations Framework Convention on Climate Change; 2. International Energy Agency; 3. Decoding the Fifth Industrial Revolution: Marching towards a resilient, sustainable and human-centric future, October 2024; CBRE Research Q3 2025, #A digital twin is a virtual replica of a physical object, system, or process that mirrors its real-world counterpart in real time using data from sensors and other sources,. *A circular economy in manufacturing is a production model that focuses on minimising waste and maximising resource efficiency by reusing, recycling, and remanufacturing materials and products throughout their lifecycle.

Shaping the Future: Drivers of Symbiotic Manufacturing

Symbiotic manufacturing reimagines industrial systems as mutually reliant ecosystems, inspired by the efficiency and circularity of nature. At its foundation lie two converging concepts: the first is the development of sustainable and future-ready industrial ecosystems, where industries collaborate by sharing resources, recycling waste, and creating closed-loop linkages that enhance both environmental and economic performance. The second is the integration of advanced technologies through Industry 4.0 and increasingly the principles of Industry 5.0 to enable intelligent, ethical, and sustainable production.

Sustainability – A Strategic Imperative

1 Regulatory frameworks pushing manufacturers to **decarbonise operations** and **adopt circular economy models**

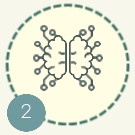
2 Companies setting ambitious targets - **net-zero emissions, zero liquid discharge (ZLD), and high waste recycling rates, among others**

3 Systematic exchange of resources through **collaborations** between diverse companies and public entities

4 **Sustainable pursuits fostering innovation** – in process design, material science, waste valorisation* technologies, etc.

Technological Innovation at Scale

1 **IoT (Internet of Things) and sensors** providing real-time data on waste and resource needs; analysing this data **using AI and Machine Learning** to identify 'waste-to-resource' opportunities



2 **Using Digital Twins**[3] for the **simulation of symbiotic scenarios**, optimising resource allocation and entire network efficiency before real-world implementation

3 **Blockchain technology** providing immutable records, ensuring traceability and fostering trust among partners

4 Utilising **cognitive engineering**[4] to optimise the human-technology interface in manufacturing

Human-Machine Synergy

1 **Collaborative robots (cobots)#** working alongside skilled workers to augment human capabilities by handling repetitive, physically demanding, or precision tasks

2 **Upskilling programs entailing** strategic investment in human capital that directly translates into organisational agility, innovation, and long-term sustainability

3 **Human-System Interaction** (HSI) focusing on design and evaluation of systems where humans and technology interact to optimise human performance and well-being within these complex systems

Crucial Context

India's manufacturing sector, contributing 17% to GDP in 2023[1], is a major source of the nation's 2.8 gigatons of GHG emissions[2], underscoring the need for sustainable manufacturing.

From 2025 to 2030, the industrial automation market in India is projected to grow at a 14–15% CAGR.[5] According to a recent survey, AI adoption is strong among industrial product manufacturers, with 55% currently using it. Roughly 40% plan to boost their AI and machine learning investments over the next three years.[6]

In 2023, cobots represented 10.5% of the global industrial robots installed during the year.[7] Over the next five years, 40% of the current skill requirements in advanced manufacturing are expected to change.[8]

*Waste Valorisation is the process of converting waste products into valuable resources.

Source: 1. Ministry of Petroleum & Natural Gas, GoI, 2023; 2. International Energy Agency, 2023; 3. A digital twin is a virtual counterpart that exactly mirrors a physical object, system, or process; 4. Cognitive engineering is a multidisciplinary field that optimises human performance and well-being by designing and evaluating complex human-technology systems, drawing from cognitive science, human factors, human-computer interaction, and systems engineering; 5. Future of the Digital Customer Experience survey, 2024, Deloitte; 6. Digital twins: The key to smart product development, 2023, McKinsey & Company; 7. Collaborative Robots - How Robots Work alongside Humans, 2024, International Federation of Robotics; 8. The Future of Jobs Report 2023, The World Economic Forum; CBRE Research Q3 2025, #Cobots are robots intended to physically interact with humans in a shared workspace, assisting with tasks while ensuring safety, flexibility, and ease of use.

4

Operationalising the Future with Real-world Applications

Operationalising the Future: Training the Lens on Real-world Applications

Building on the principles of symbiotic manufacturing, which integrates climate mandates, advanced technologies, and human-centric operations, CBRE Research, in this section, highlights how next-generation industrial parks are bringing this vision to life globally. By leveraging smart infrastructure and human-machine synergy, these parks are creating resilient, sustainable, and human-centric ecosystems. The following analysis outlines key applications, supported by real-life examples, that demonstrate their impact on operational efficiency and output.

EMERGING TECHNOLOGY

Supply Chain Management

AI-powered tools enable real-time tracking, demand forecasting, and logistics optimisation, improving visibility and reducing costs

CASE STUDY

Unilever's AI-driven supply chain platform in Singapore uses machine learning to predict demand based on inventory, weather, and economic data[1]

IMPACT

Achieved **98% product availability** in a trial with Walmart and **reduced human effort by an estimated 30%**[1]

Quality Control and Assurance

AI-driven systems detect defects with high precision, ensuring product quality and consistency

CASE STUDY

BMW's Munich plant uses AI vision systems to inspect welds, identifying defects in real time[3]

IMPACT

Up to **30% reduction in production planning** costs anticipated[3]

Warehouse Optimisation

Machine learning optimises warehouse layouts, increasing space efficiency and reducing inventory travel time

CASE STUDY

A large e-commerce player's fulfilment centres employ AI to redesign racking systems, expediting access from receiving to shipping[2]

IMPACT

Increased warehouse storage capacity by 75% and **reduced picking time by 25%**[2]

Predictive Maintenance

IoT sensors and advanced analytics monitor machinery health in real time, detecting anomalies to prevent failures

CASE STUDY

Siemens provides integrated predictive maintenance solutions, including Senseye Predictive Maintenance, to assist companies in industries such as bauxite, alumina, and aluminium production[4]

IMPACT

20% reduction in unplanned downtime, ROI goals achieved within just 4 to 6 months

Source: 1. Utilising AI to redefine the future of customer connectivity, Unilever, July 2024; 2. A large e-commerce player announces two new ways it's using robots to assist employees and deliver for customers, October 2023; 3. AI and smart use of data at BMW Group Plant Munich, February 2020, 4. Aluminium manufacturer: 20% reduction in unplanned downtime, Siemens, August 2023

Operationalising the Future: Training the Lens on Real-world Applications

Global climate mandates such as the Paris Agreement have made sustainability crucial across industrial parks. Therefore, sustainability is embedded into manufacturing processes, moving beyond buzzwords to actionable practices that reduce environmental impact and enhance resilience.

INTEGRATING SUSTAINABILITY

Sustainable Manufacturing

Cobots and smart systems optimise energy use and minimise waste in production lines

CASE STUDY

A tier-I automotive manufacturer in Europe used **GE Vernova's Proficy for Sustainability Insights** to optimise energy usage in its factory heating systems[1]

IMPACT

Achieved 18% energy savings by optimizing heating and cooling systems[1]

Energy Management

AI-driven systems monitor and optimise energy use in real time

CASE STUDY

Foxconn's Shenzhen factory uses **IoT to streamline resource use**[3]

IMPACT

Achieved 42% reduction in scope **3 emissions, 24%** cut in scope 1 and 2 emissions, and an increase in recycled material content from **55% to 75%**[3]

Circular Products

Products are designed for recycling, reuse, and disassembly, supporting circular economy goals

CASE STUDY

Dell's closed-loop recycling programme **repurposes plastics into new products**

IMPACT

Recycled over 2.5 billion pounds of electronics since 2007[2]

Integration of Renewable Energy

Manufacturing processes incorporate solar, wind, and other renewables for green production

CASE STUDY

Tesla Gigafactory 1 in the U.S is **powered by a massive solar array and other renewable sources**[4]

IMPACT

Factory **designed to achieve a net-zero energy goals**[4]

Source: 1. GE Vernova unveils new AI-based software to advance industrial sustainability and operations goals simultaneously, GE, February 2024, 2. What happens to recycled equipment, Dell company website, 3. Foxconn Industrial Internet - Shenzhen - Sustainability, World Economic Forum, October 2024; 4. The Tesla Gigafactory World of Renewables, October 2024

Operationalising the Future: Training the Lens on Real-world Applications

EMBEDDING THE HUMAN TOUCH: UPSKILLING AND RESKILLING

Skilled Decision-Making

Use of technology to make complex, context-driven decisions requiring creativity and intuition

CASE STUDY

Airbus' A350 production line integrates AI analytics with human oversight to optimise assembly decisions[1]

IMPACT

30% reduction in time spent on quality inspections[1]

Collaborative Robotics

Cobots perform repetitive or hazardous tasks alongside humans, enhancing safety and productivity.

CASE STUDY

Puratos, a global food ingredient company, integrated the **Cobot Lift system from Universal Robots to assist with heavy lifting tasks** in its production lines[3].

IMPACT

Increased payload capacity from 10 kg to 45 kg, enabling automation of previously manual, labor-intensive tasks[3].

Digital Twins and Simulations

Virtual models simulate processes, enabling workers to optimise decisions and understand complex systems

CASE STUDY

A global retailer created **a digital twin of its entire supply chain,** including manufacturing, logistics, and distribution[2]

IMPACT

Reduced carbon emission by 7% and improved customer order output by 5%[2]

Continuous Learning and Adaptation

Upskilling programs train workers in AI, robotics, and analytics, ensuring adaptability. India's Skill India Mission targets to train 400 million workers by 2030[5]

CASE STUDY

Tata Steel runs a structured **Digital Capability Development Programme** through its Tata Steel Industrial Consulting (TSIC) division[4]

IMPACT

Improved **workforce agility, exposure to integrated remote operations centres** and **digital supply chains**[4]

Source: 1. How Airbus is navigating a digital transformation – McKinsey & Co., June 2017; 2. Universal Robots; Digital twins: When and why to use one – McKinsey & Co, April 2024, 3. Cobot Lift and Puratos case story, Universal Robots, February 2022, 4. Digital Capability Development Program, Tata Steel, 5. India's digital dividend, KPMG, January 2025

5

Essential Infrastructure: Backbone of Thriving Industrial Parks

Next-gen Industrial Parks Steering Journey to Industry 5.0

What are next-generation industrial parks?

Next-generation industrial parks are advanced, meticulously planned zones that transcend traditional industrial models by integrating cutting-edge technology, sustainability, and community-centric design.

WHY ARE THEY IMPORTANT?

Catalyse Economic Growth

Attract global investment and support high-value industries.

Employment Node

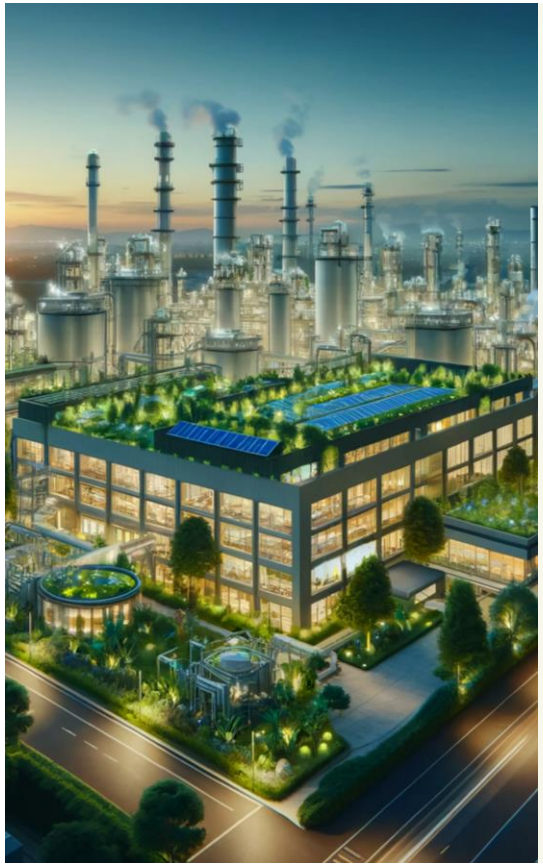
Create employment opportunities across skilled and semi-skilled roles

Promote Sustainable Urbanisation

Integration of green infrastructure and circular economy principles

Powering National Ambitions

Alignment with initiatives such as 'Make in India' and 'Smart Cities Mission'



The role of a next-generation industrial park

Next-generation industrial parks are redefining manufacturing by integrating smart infrastructure, renewable energy, and digital connectivity with a focus on human-centric innovation. These hubs are emerging as critical centres for sustainability and innovation, driven by environmental concerns, resource limitations, and technological advancements. This evolution is also making them highly effective at attracting and retaining skilled talent.

Eco-industrial Parks

Integrating sustainable design, resource efficiency, and use of renewable energy sources such as solar and wind to reduce reliance on carbon-intensive fuels.

Technological Innovation

Leveraging advanced technologies to optimise operations and enhance global competitiveness enabling real-time data exchange, predictive maintenance, and efficient resource allocation.

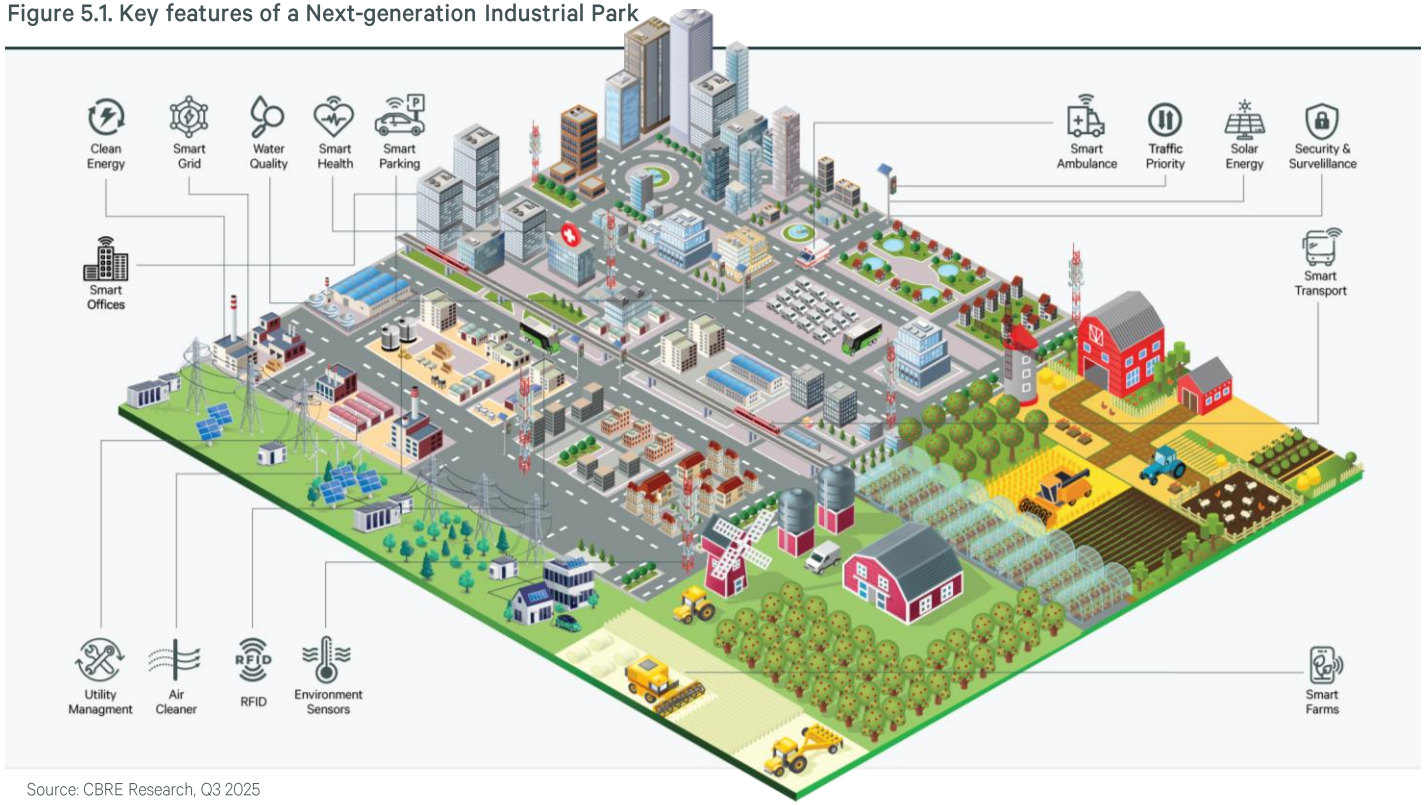
AI Boosting Human Potential

Fostering environments where creativity and technology converge to enhance productivity and enable customized production.

The Real Estate Narrative: Role of Next-generation Industrial Parks

In today's global landscape, industrial parks are increasingly specialised, sustainable, and digitally integrated. Traditional industrial parks, designed primarily for linear production models, are becoming inadequate for modern manufacturing needs. Therefore, industries are moving away from static, siloed greenfield developments and are instead cultivating dynamic, integrated ecosystems or next-gen industrial parks that embody the principles of **symbiotic manufacturing**. Countries such as China, Singapore, Japan, Thailand, Vietnam, Germany, etc., are leveraging these parks not only for manufacturing but also as pivotal components in their long-term economic strategies. For instance, Singapore's Jurong Innovation District (JID) and China's Suzhou Industrial Park are manufacturing hubs focusing on high-tech industries, research & development, and green infrastructure.

Figure 5.1. Key features of a Next-generation Industrial Park



Source: CBRE Research, Q3 2025

Figure 5.2. Notable global real estate trends shaping next-gen industrial parks

Specialised clustering

Focusing on key sectors, including electronics, pharmaceuticals, and semiconductors

Eco-Industrial Parks

Emphasizing energy efficiency and circular economies as a response to pronounced climate mandates

Smart Parks

Integrating advanced technologies such as IoT, AI, robotics, and industry 4.0 principles

Mixed-use Zones

Thoughtfully designed industrial parks that incorporate residential, commercial, and social infrastructure

Public Private Partnership

Harnessing the strength of collaborative efforts between policymakers and the private sector

Emerging Sectors

Focusing on green hydrogen, electric vehicles, and semiconductor manufacturing

The Evolution of Next-Generation Industrial Parks

CBRE Research has outlined the stages of this evolution, charting the infrastructure required to pave the way towards a future-ready industrial ecosystem. The evolution towards next-generation industrial parks is divided into three distinct stages, each representing a deeper integration of technology, sustainability, and human-centric operations. While current implementations within industrial parks are still emerging, often incorporating only one or two aspects, the ultimate goal is to achieve a fully integrated ecosystem that embodies the principles of symbiotic manufacturing.

1

Tech

Foundational (5G, IoT, automation-readiness)

Sustainability

Nascent (30% renewables, net-zero planning, ZLD systems*)

Human Development

Minimal (basic facilities, proximity to skill centers)

2

Tech

High (digital twins, AI, 'plug-and-play' units)

Sustainability

High (50% renewables, green certifications, complete monitoring of emissions)

Human Development

Emerging (social infrastructure, training hubs, creches)

ADVANCED

Tech

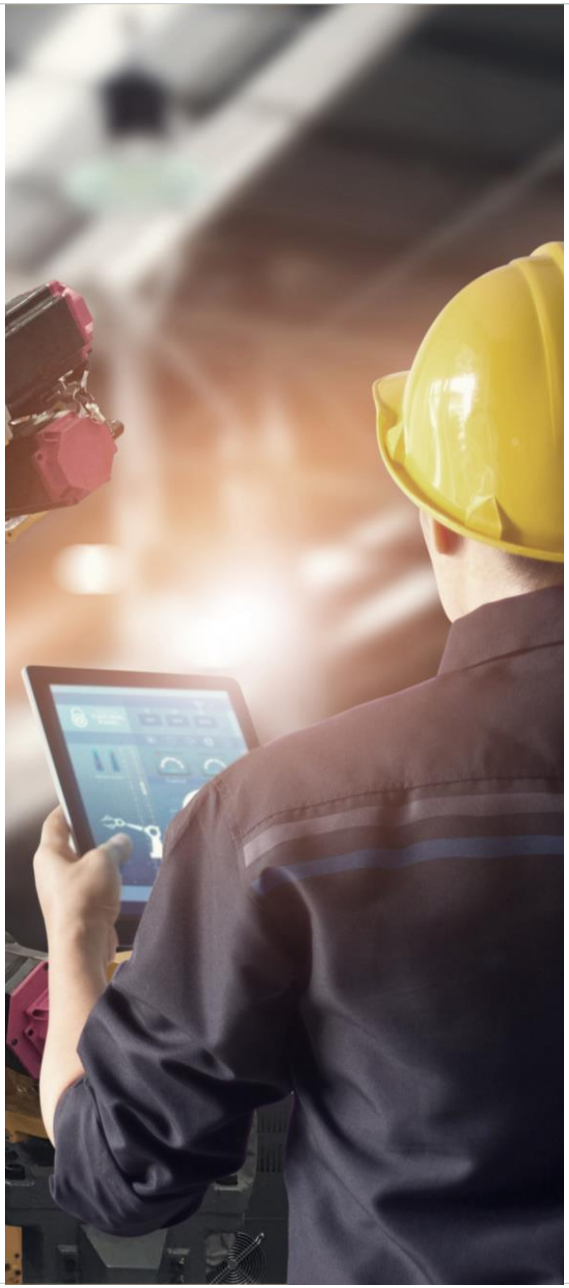
Supportive (cobot zones, AR / VR training) to mature (autonomous logistics, AI supply chains)

Sustainability

High (70 - 80% renewables, early circularity, 90% waste diversion)

Human Development

High (upskilling, inclusivity, holistic amenities, governance council)



*Zero Liquid Discharge (ZLD) systems in industrial parks are advanced wastewater treatment setups that aim to recover and reuse nearly all industrial wastewater, ensuring no liquid waste is discharged into the environment, leaving only solid by-products

Source:, CBRE Research, Q3 2025

Stage 1: Strategic Foundations - Where Most Industrial Parks Currently Stand

At present, many industrial parks in India are in the foundational stage, focusing primarily on technological integration to support modern manufacturing needs. This stage is characterised by the following:

Technology

MODERATE (~40%) ADOPTION

Industrial parks are equipped with basic smart infrastructure, including 5G networks and IoT-enabled systems to facilitate real-time data exchange and smart automation.

Focus is on automation-readiness in vision planning, targeting Industry 4.0 goals.

The adoption of advanced technologies such as digital twins and AI-driven analytics continue to gain prominence.

Sustainability

NASCENT (~30%) ADOPTION

Environmental efforts are nascent, with basic renewable energy adoption, such as solar panels, by a few parks.

Site selection considers environmental clearances, ensuring necessary regulatory compliance.

Human Development

LOW (~20%) ADOPTION

Minimal amenities / basic facilities (e.g., worker restrooms, canteens).

Training programmes are sporadic, and collaborative zones for human-machine interaction are rare, reflecting a focus on operational efficiency over workforce wellbeing.

Primary focus is on operational efficiency over technical expertise and employee wellbeing.

Source: CBRE Research, Q3 2025

Stage 2: Transitional Integration - Balancing Sustainability and Technology

Stage 2 emphasises technology and sustainability, with parks becoming digitally enabled and ESG-compliant, while human development begins to emerge as a priority. This stage is characterised by the following:

Technology

HIGH (~60-70%) ADOPTION

Digitally integrated plots with pre-installed 5G, IoT, and automation conduits.

'Plug-and-play' units with automation-ready layouts supporting smart manufacturing.

AI-driven ESG dashboards enabling real-time tracking of energy and waste, enhancing operational efficiency.

Sustainability

MODERATE (~50%) ADOPTION

Renewable energy, primarily from solar and wind, now accounts for 50% of usage. Water conservation is achieved through zero liquid discharge (ZLD) systems and rainwater harvesting. While waste management improves with on-site recycling, circular economy practices are still in their early stages, focusing on waste segregation over full material reuse.

Green certifications (LEED, IGBC) including top-tier certifications (e.g., LEED Platinum) and use of sustainable materials.

Human Development

MODERATE (~40%) ADOPTION

Presence of human-centric infrastructure within parks offering training hubs and basic amenities such as housing, hospitals, office spaces, creches, and green spaces along with partnerships with universities.

Comprehensive workforce well-being programmes and inclusivity initiatives are still developing in this stage.

Strategic connectivity to residential areas and availability of public transport.

Source: CBRE Research, Q3 2025

Advanced Stage: The Future of Industrial Parks - A Holistic Ecosystem

Advanced stage shifts the focus to human development, with technology and sustainability playing supportive roles to create a collaborative ecosystem.

Technology

VERY HIGH (~85 – 90%) ADOPTION

Continued tech advancement with robot-friendly zones, worker safety sensors, and AR / VR training platforms to enhance human-machine synergy.

Infrastructure features include fully autonomous logistics (e.g., drones, AGVs), AI-optimised supply chains, and innovation hubs for cutting-edge R&D.

Digital twins and AI analytics remain integral; cybersecurity infrastructure is robust, protecting against rising digital threats.

Sustainability

STRONG / MATURE (~70 - 90%) ADOPTION

Circular economy principles are fully embedded, with closed-loop systems enabling waste diversion and material reuse, such as fly-ash in construction. Parks integrate renewable energy with advanced storage systems and implement waste diversion through closed-loop recycling.

Carbon-negative designs, including carbon capture technology, allow them to surpass net-zero targets. Additionally, the creation of biodiversity zones and green roofs enhances ecological resilience.

Human Development

HIGH (~60 – 70%) ADOPTION

Comprehensive amenities such as urban forests, recreational facilities, create a live-work-learn ecosystem, alongside smart communities equipped with IoT-enabled homes and telehealth centres.

Collaborative zones foster human-robot interaction, supported by platforms for lifelong learning. A dedicated park governance council, comprising developers, officials, and occupiers, ensures adaptive management and strong community engagement.

Notable Examples

Kalundborg eco-industrial park: This park located in Denmark saves the city of Kalundborg 24 million euros and eliminates 635,000 tonnes of CO2 annually. It also helps conserve 3.6 million cubic metres of water, 100 GWh of energy, and 87,000 tonnes of solid materials each year.[1]

NXpark in China: Akila employed digital twin technology and AI to enhance mechanical and electrical layout and energy efficiency, achieving approximately 58.7% in energy savings and carbon reduction through clean energy, including ground-source heat pumps and rooftop photovoltaics.[2]

Dholera SIR: India's first and largest planned greenfield smart industrial city integrates smart infrastructure such as underground utility corridors, ZLD systems, and stormwater reuse. Dholera's layout encourages industrial symbiosis, where waste from one industry can serve as input for another, reducing environmental impact. Its holistic planning—combining industrial, residential, and recreational zones—positions it as a model for sustainable, human-centric industrial development in the country.[3]

Source: 1. Kalundborg's Eco-Industrial Park Transformed Waste into Savings, Engie Impact, June 2021; 2. Digital Twin for Industrial Parks under Dual Carbon Goals, China – Europe Carbon Neutrality; 3. Gujarat Cleaner Production Centre, July 2017; CBRE Research, Q3 2025

Case Studies – Key Stakeholders Showcasing Holistic Development

The infrastructure provisions and stakeholder collaboration are shaping industrial parks worldwide, offering lessons for India's evolution. CBRE Research has highlighted a few case studies that illustrate how the triad of technology, human development, and sustainability is applied globally and nationally.

Case Studies: Industrial Parks Showcasing Various Development Stages

CASE STUDY: 1

China: Suzhou Industrial Park (SIP) – Technology-driven growth amidst sustainable practices

Key Features: Specialised Clustering, Intelligent Operation Centre, Circular Economy Model

Established in 1994, the Suzhou Industrial Park is a joint venture between Singapore and China government, occupying ~278 sq. km.[1] of land, including industrial, commercial, and residential areas. **Electronics and high-end equipment manufacturing** industries dominate the park-level sectoral mix, followed by several emerging industries such as **biomedicine, nanotechnology,** and **cloud computing**. Over the past few years, multiple technology and sustainability-focused initiatives have been undertaken at the SIP.

The park is managed through an **Intelligent Operation Centre (IOC)**, built and launched by Huawei, a major China-based technology firm. This system acts as an aggregate park-level operation management tool, leveraging several technologies such as big data, IoT, and AI. The tool collects and analyses over 150 million data points through 43 service systems and more than 13,000 IoT-based sensors[2], installed by multiple government agencies. The IOC system has improved performance and energy utilisation at the park by around 8 GW+, leading to over 10% reduction in CO2 emissions and average energy costs[2].

The SIP utilises the **circular economy model** to maximise the reuse of industrial by-products by creating a synergy between its sludge drying plant, co-generation plant, and wastewater treatment plant. This system saves about 24,000 tonnes of coal, 136,000 tonnes of desalted water, and about 20,000 tonnes of solid waste annually[3]. The park's hazardous waste treatment project recovers 70,000 tonnes of steam annually, reducing CO2 emissions by ~13,000 tonnes and saving 4.76 million m3 of natural gas.[4]

CASE STUDY: 2

Japan: TSMC's Kumamoto plant re-clustering the semiconductor industry and fostering social-centric development

Key Features: Specialised Clustering - Semiconductor, Government-led Collaboration, Mixed Use Zones

In the midst of a significant realignment in the global supply chain, **a prominent player in the semiconductor industry** forayed into Japan. This industrial facility, located in Kikuyo, Kumamoto Prefecture, was constructed by Japan Advanced Semiconductor Manufacturing (JASM), a collaborative effort between Taiwan Semiconductor Manufacturing Company Limited (TSMC), the Sony Group, and Denso Corp.[5]

Since the announcement of TSMC's project in 2021, a wave of semiconductor-related companies has unveiled plans to either establish new factories or expand existing ones throughout the region. At the start of 2025, **Toyota Motors** acquired a minority share in the venture.[6] To ensure the local workforce is equipped with the necessary skills to thrive in the semiconductor sector, **the Japanese government-initiated training programmes throughout the key manufacturing regions** of Kyushu, Tohoku, and Chugoku. The influx of new factories has also led to a notable population growth in the surrounding areas. In response, the Kumamoto Prefectural Government prioritised the **development of critical infrastructure, including the procurement of industrial land, enhancements to roads and railways, and the construction of housing for workers.[7]**

The economic ramifications of TSMC's plant are substantial, with estimates suggesting an impact ranging between **USD 135 to USD 170 billion (JPY 20 to 25 trillion)** between 2021 and 2030.[6] Furthermore, the creation of a new company town is expected to drive the need for additional community amenities, such as supermarkets, shopping outlets, public facilities, and various infrastructure developments.

Source: 1. Industrial Clusters- Working together to achieve net zero, Accenture; 2. The Atlas of Urban Tech, 2024; 3. Suzhou Industrial Park sludge treatment project, source recycling model, Suez Asia, 2024; 4. Waste-to-resource solution helps the Suzhou Industrial Park become a model of synergetic recycling, Suez Asia, 2024; 5. Manufacturing agglomeration set to boost logistics demand, CBRE Research, March 2023; 6. Multiple news articles; 7. Latest estimates as per the Kyushu Economic Research Centre, December 2024; CBRE Research, Q3 2025

Case Studies: Industrial Parks Showcasing Various Development Stages

CASE STUDY: 3

Thailand: AMATA City Chonburi transitioning from a conventional industrial zone into a net-zero, tech-enabled ecosystem

Key Features: Eco-Industrial Park, Government-led Collaboration

AMATA City Chonburi is a pioneering example of a **Green and Smart Industrial Estate in Southeast Asia.** Developed in collaboration with the Global Green Growth Institute (GGGI), this estate is **transitioning from a conventional industrial zone into a net-zero, tech-enabled ecosystem.** The estate integrates renewable energy systems, smart grids, and digital infrastructure to optimise resource use and reduce emissions. It includes green corridors, public spaces, and facilities that support worker wellbeing. The developer, Amata Corporation, works closely with the Thailand government and private sector tenants to implement policies and technologies that align with global climate goals.[1]

The project aimed to leverage Amata's vision and GGGI's expertise to identify green projects that can enhance economic, social, and environmental conditions. It involved **engagement with various stakeholders,** including Amata Corporation (developer), Industrial Estate Authority of Thailand, government agencies at national, regional, and local levels, businesses and industries within the Amata estate along with local communities and residents.

CASE STUDY: 4

India: Sri City Integrated Business City, Andhra Pradesh, prioritises sustainable industrial growth

Key Features: Specialised Clustering - Electronics Manufacturing, Government-led Collaboration

Sri City stands as a prime example in India of a sustainable **private industrial park, developed in partnership with the Government of Andhra Pradesh (GoAP).** This development includes a multiproduct SEZ, a Domestic Tariff Zone (DTZ), a Free Trade & Warehousing Zone (FTWZ), and an **Electronics Manufacturing Cluster,** serving as a vital case study for developers, government bodies, consulates, embassies, and researchers focused on sustainable urban development.

Sri City offers a holistic environment, designed on a 'Work, Live, Learn, Play' ethos, supported by ISO 9001 and 14001 certifications for **Quality Management System (QMS)** and **Environmental Management System (EMS)** and an **IGBC Gold rating**. It provides a robust supply chain ecosystem with easy access to raw materials and critical infrastructure such as power and water. The park is built for scalability and fosters cluster development, promoting collaboration among industries and supporting ancillary sectors, while also providing access to a diverse talent pool.

Furthermore, Sri City prioritises community wellbeing through developed social infrastructure (schools, housing, medical clinics), facilitating in application and processing of industries, coupled with **single-window clearance mechanism established by the government.[2]**

Source: 1. Green & Smart Industrial Estate Model: Case Study of AMATA City Chonburi, Thailand, GGGI, November 2019; 2. Sricity SEZ website; CBRE Research, Q3 2025

Case Studies: Industrial Parks Showcasing Various Development Stages

CASE STUDY: 5

India: Dholera Special Investment Region (SIR), Gujarat, stands for smart, sustainable, and scalable development

Key Features: Eco-Industrial Park, Smart IOC, Government-led Collaboration

The Dholera special investment region (SIR), situated in Gujarat, represents **India's first greenfield smart industrial city** under the ambitious Delhi-Mumbai Industrial Corridor (DMIC) initiative.

At the heart of Dholera SIR is its **Integrated Command and Control Centre (ICCC),** complemented by advanced real-time monitoring systems and IoT-enabled utilities that enhance the management of water, power, and waste. This cutting-edge infrastructure is pivotal in creating a resource-efficient environment. Additionally, the region is being developed as a **100% renewable energy zone,** featuring extensive solar parks and smart grids designed to provide sustainable power to industries. The comprehensive master plan for Dholera SIR incorporates affordable housing, educational zones, healthcare facilities, and green mobility corridors, and by 2040, the project is expected to create over 800,000 jobs, emphasising skill development for the local population and their integration into high-tech manufacturing and services sectors.

The project is jointly overseen through a **collaborative governance model** between Government of India and the Government of Gujarat through the Dholera Industrial City Development Limited (DICDL). Private developers and global technology partners play a critical role in contributing to the infrastructure, innovation, and operational frameworks of the city.[1]

Source: 1. Dholera, SIR, Gujrat; CBRE Research, Q3 2025

6 *Strategic Recommendations*

Challenges: Infrastructure Gaps and Systemic Bottlenecks

Regulatory Framework and Policy

- **Land Acquisition and Zoning Constraints:** Lack of clear land titles; zoning mismatches often hinder the timely development of industrial parks
- **Environmental Compliance and Delays** Lengthy and complex environmental clearance processes could delay project timelines
- **Lack of Standardisation in Industrial Park Development** Absence of uniform benchmarks / rules / certification frameworks at the central and the state levels

Infrastructure and logistics issues

- **Infrastructure Bottlenecks** Inadequate last-mile connectivity despite significant strides, lower load bearing capacity of roads often raising logistics costs for heavy goods
- Lack of adequate, appropriate power and water supply (raw / treated water basis industry type / use) as requirements vary across sectors
- **Fragmented Logistics Ecosystem** Fragmented adoption across multimodal transport integration, warehousing, and cold chain infrastructure
- **Digital Infrastructure Gaps** While urban centres are well-connected, many industrial zones especially in tier-II and III cities, often lack robust digital infrastructure

Labour laws & workforce limitations

- **Skilling & Workforce Transition** Shortage of skilled labour in advanced manufacturing, AI, and cobot operations, limited collaboration with skill development institutes
- **Labour Availability** Difficulty in sourcing labour in remote locations
- **Restrictive Implementation of Labour Laws** Uneven implementation of labour laws across locations due to political dynamics and trade union negotiations
- **Limited Access to Green Financing** Access to affordable financing for green infrastructure (especially for developers and MSMEs)

Access to funding

- **Limited Access to Green Financing** Constrained access to affordable financing for green infrastructure such as renewable energy (especially for developers and MSMEs)
- **High Costs of Sustainable Upgrades** Limited adoption of energy-efficient / compliant retrofitting in industrial parks due to lack of subsidised / low-cost green loan options
- **Disparities between State and Central Policies** Variations in government policies regarding subsidies, tax incentives, exemptions, etc.

Source: CBRE Research, Q3 2025

A Collaborative Framework: Developer-led Provisions

The insights from various industrial park development stages and global case studies discussed in the previous sections highlight the need for a collaborative framework. This section aims to outline strategic recommendations for stakeholders—developers and government entities—to collectively modernise India's manufacturing infrastructure.

Figure 6.1: Developer-led provisions

Liaisoning and Regulatory Navigation

- Assist manufacturers in navigating government processes, ensuring faster project completions.
- Provide plots with clear titles and pre-secured statutory documents.
- Partner with local authorities to streamline environmental clearances, thus reducing setup delays for tenants.

Providing Critical Physical Infrastructure

- Ensure reliable power and water supply (potable, raw, and industrial use), high-capacity power infrastructure with backup generators, and on-site water treatment plants
- Implement effluent and waste treatment plants with clear discharge protocols, achieving zero liquid discharge (ZLD) at later stages
- Facilitate water recycling for bioavailability and groundwater recharge

Enabling Strategic Location and Connectivity

- Select sites close to highways, freight corridors, integrated logistics terminals, and ports, with access roads designed for optimum load-bearing capacity
- Ensure access to manpower and ancillary industries (e.g., MSMEs) in the vicinity, supporting supply chains
- Allocate space for trucking movement, loading / unloading zones, and parking to streamline logistics and reduce operational delays

Provisioning for Future Scalability

- Designate zones within industrial parks for future expansion, allowing for scalability without disrupting operations
- Plan for vertical expansion with high roof clearances and load-bearing structures, supporting a park's automation needs at an advanced stage (e.g., AGVs, drones)
- Allocate space for emerging technologies, such as R&D labs for green hydrogen or semiconductor innovation

Customisation of Infrastructure Needs

- Conduct sector-specific studies to determine resource requirements (e.g., assessment of water and power needs for a pharmaceutical cluster vs. a food & beverage park)
- Design infrastructure to support sector-specific technologies such as heat-resistant flooring for heavy industries or automation-ready layouts for tech-driven sectors (e.g., semiconductors)
- Plan for future upgrades to avoid costly retrofitting

Furnishing 'Plug-and-Play' Utilities

- Provide modular configurations with pre-installed utilities (power, water) and digital 'plug-and-play' infrastructure, including 5G and IoT readiness.
- Design automation-ready layouts with pre-configured network access, supporting Stage 2's adoption of digital twins ensuring scalability of utilities to accommodate growth.

Source: CBRE Research, Q3 2025

Figure 6.1: Developer-led provisions

Providing Smart Factory-Ready Infrastructure

- Embed IoT frameworks, high-speed 5G infrastructure, and AI-integrated building management systems for real-time monitoring
- Design large floor plates with high roof clearances, heat-resistant, and high-load-bearing flooring to support automation (e.g., cobots, AGVs).
- Establish R&D labs and innovation centres, partnering with tech firms to drive advancements in sectors such as green hydrogen and semiconductors, a key feature of Advanced Stage* parks
- Integrate robust cybersecurity infrastructure (e.g., AI-driven threat detection), ensuring data security

Incorporating Sustainable Features

- Pursue key environmental certifications (e.g., LEED Platinum, IGBC) with daylight-optimised designs[1], solar-powered utilities, and EV charging stations
- Integrate renewable energy sources (solar, wind, bioenergy) and facilitate advanced energy storage for reliability, supporting India's net-zero by 2070 goal.[2]
- Integrate urban forests, green roofs, and biodiversity zones to enhance air quality and ecological resilience, as envisioned in Advanced Stage* parks' carbon-negative designs
- Adopt circular economy practices, such as closed-loop systems, shared material banks, and remanufacturing[3] hubs

Promoting Social-Centric Development

- Promote mixed-use development (wherever possible) with housing, hospitality, schools, and office spaces, creating a live-work-learn ecosystem.
- Build training hubs for upskilling (e.g., AI, robotics), creches for working parents, and collaborative zones for human-cobot interaction.
- Foster an ecosystem of ancillary industries to support MSMEs, facilitating local economic growth.
- Plan for smart communities with IoT-enabled homes, telehealth centres, and digital learning platforms.

Source: 1. Daylight-optimised designs leverage natural light to enhance energy efficiency, worker productivity and sustainability. 2. Ministry of Environment, Forest and Climate Change of India; 3. Remanufacturing involves rigorous disassembly, refurbishment, testing, and reassembly to meet or exceed original performance standards; CBRE Research, Q3 2025,

A Collaborative Framework: Government-led Provisions

Figure 6.2. Government-led provisions

Developing Necessary Industrial Infrastructure

- Enable a universally accepted framework for onboarding a master developer, from the initial site selection to project delivery
- Accelerate the deployment of advanced infrastructure to facilitate the transition to Industry 4.0/5.0 and dark factories
- Partner with master developers to leverage their expertise in integrating new technologies into the development process

Ensuring Industrial Development Expands Beyond Select Locations

- Industrial activity is currently clustered in fragmented regions (close to major cities), primarily within large states such as Tamil Nadu, Uttar Pradesh, Karnataka, Gujarat, and Maharashtra
- Develop a strategic framework for the comprehensive development of emerging urban centres / regions, thereby improving their appeal to investors and enhancing overall connectivity

Skilling & Innovation Support through Partnerships

- Establish Centres of Excellence (CoEs) focused on AI and robotics, cognitive technologies alongside industrial training institutes.
- Integrate apprenticeships with vocational training for industry-relevant skill sets.
- Facilitate collaborations with universities and tech companies.

Furnishing Policy Framework for Triad Integration

- Develop sector-specific policy frameworks that promote innovation in AI, human-machine collaboration, and sustainable manufacturing practices
- Simplify / expedite regulatory approvals for environmental clearances and land acquisition
- Reduce the compliance burden on businesses, especially SMEs, by minimising mandatory filings and procedures

Promoting Tech-Enabled Industrial Clusters

- Promote the integration of advanced technologies across sectors.
- Foster public-private partnerships that stimulate innovation in manufacturing solutions.
- Facilitate availability of high-speed internet and innovation clusters that support advanced industries.
- Aid the development of smart manufacturing hubs and efficient supply chains, optimised through AI-driven management of energy and water resources.

Offering Incentives and Fiscal Support

- Consider revising tax policies to be industry-specific, further encouraging R&D and innovation
- Provide rebates for green building certified projects and additional floor area ratio (FAR) for environmentally sustainable developments
- Facilitate financial assistance for human-centric amenities (housing, healthcare) and tax breaks for initiatives that promote the circular economy

Source: CBRE Research, Q3 2025; Manufacturing 5.0: Accelerating Telangana's industrial transition from Industry 4.0 to 5.0, EY and CII, March 2025

1. Dark factory is a manufacturing facility that is fully automated and operates with little to no human intervention on-site.

A Collaborative Framework: Investor-led Provisions

While developers focus on physical infrastructure and governments on policy and public utilities, institutional investors and private equity (PE firms) play a pivotal role in mobilising capital to scale, de-risk, and institutionalise industrial infrastructure.

Figure 6.3. Investor-led provisions

Platform Creation and Aggregation

Create / co-create industrial platforms - entities that consolidate multiple parks or assets under a unified operational and governance framework. These platforms:

- Enable capital pooling across geographies and asset types
- Allow for portfolio-level risk diversification
- Are structured to attract follow-on investments from global pension funds, sovereign wealth funds, REITs, etc.

Enabling Access to Capital

- Green bonds and ESG-linked loans tied to sustainability KPIs
- If required, deploy structured finance instruments (e.g., mezzanine debt, credit-enhanced leases) to de-risk early-stage development
- Develop a venture capital ecosystem with credit guarantees, tailored for manufacturing startups / SMEs and industrial infrastructure

Facilitating Institutional-Grade Governance and Reporting

- Develop institutional-grade governance for tenant management, lease structuring, and ESG reporting
- Follow standardised reporting systems aligned with global benchmarks (e.g., GRESB, SASB)
- Create digital dashboards for real-time asset performance tracking, lease management, and sustainability metrics

Enabling Monetisation and Exit Infrastructure

Formulate diverse investment strategies for monetisation and facilitating exits which may include:

- Build-to-core strategies for long-term income generation.
- Build-to-sell models for strategic divestment to global operators or REITs.
- Asset recycling mechanisms to reinvest capital into new developments.
- Exit strategies through REITs, InvITs, or strategic sales to sovereign or pension funds.

Developing Risk Management Infrastructure

- Incorporate climate-resilient design, cutting-edge cyber security systems, insurance-backed guarantees for operational and environmental risks – these approaches could help de-risk by minimising vulnerabilities

Source: CBRE Research, Q3 2025

7

CBRE: An Overview of Our Industrial & Logistics Business Lines and Services

CBRE India

CBRE was the first International Property Consultancy to set up an office in India in 1994. Since then, the operations have grown to include more than 13,000 professionals across 17 offices in the country.

The guiding principle at CBRE is to provide strategic solutions that make real estate holdings more productive and economically efficient for our clients across all service lines. With an unrivalled presence in over 300+ cities in India, including affiliates and strategic partnerships, we develop local market intelligence into measurable results for clients.

~475+
million sq.ft. of real estate space under management

~$10
billion of land & assets sales and capital raised for clients since 2016

425+
million sq.ft. of total space transacted

1.2+
billion sq.ft. of projects managed

4,000+
consulting mandates undertaken

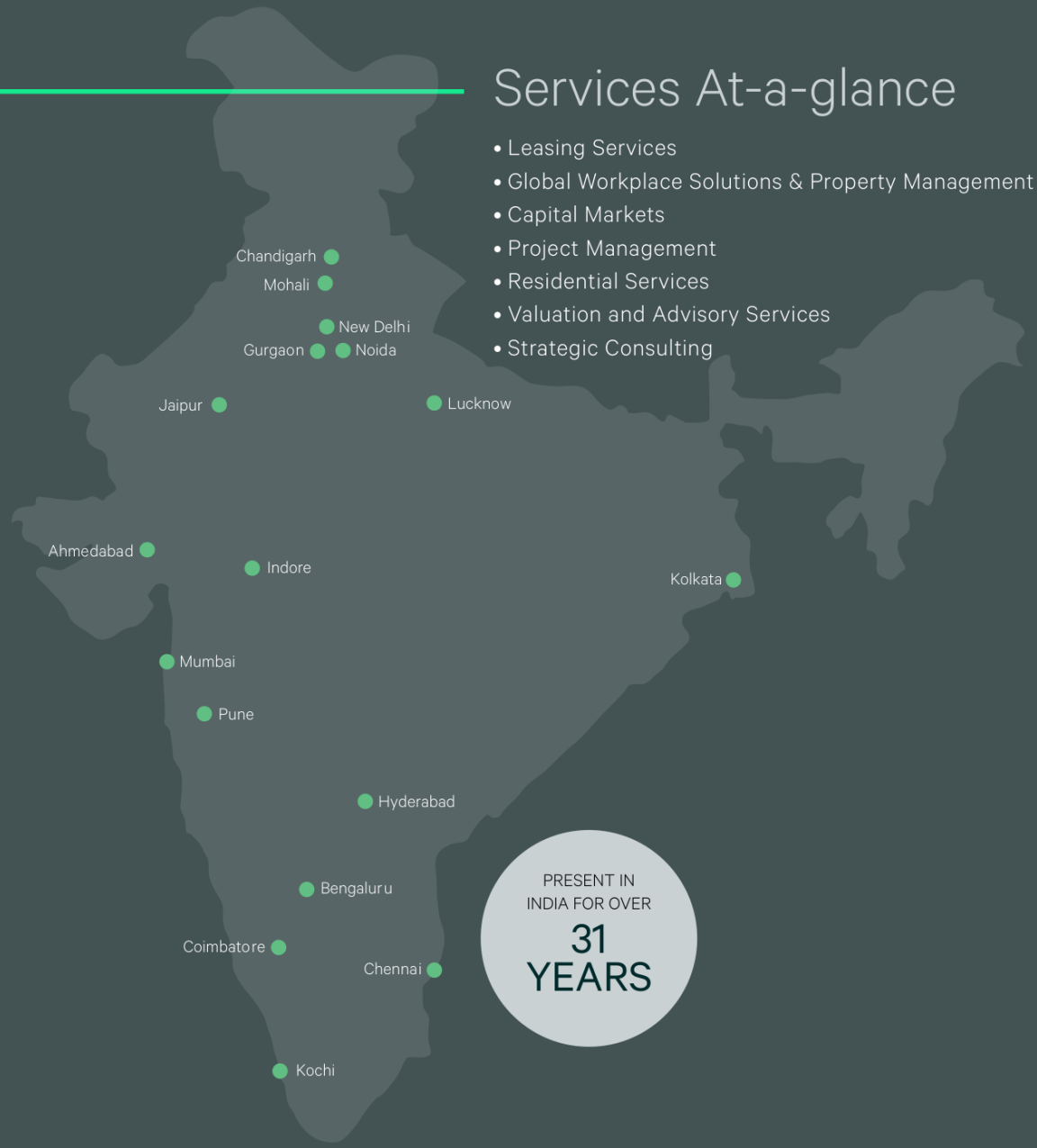
3,50,000+
properties valued across all asset classes

INDUSTRY COVERAGE

- 8 out of 10 multinational banks
- 4 out of 5 top IT/ITeS firms
- 4 out of 5 top telecom firms
- 7 out of 9 leading automobile companies

Services At-a-glance

- Leasing Services
- Global Workplace Solutions & Property Management
- Capital Markets
- Project Management
- Residential Services
- Valuation and Advisory Services
- Strategic Consulting



Awards

FORTUNE 500

#128

FORTUNE Most Admired Company

#1

in real estate for 15th consecutive year

Ethisphere World's Most Ethical Companies

12

years in a row

Realcomm Digie Award 2024 for Best AI Innovation in Commercial Real Estate

Lipsey

#1

brand for 24 consecutive years

Disability Equality Index : Recognized as a Best Place to Work for Disability Inclusion and earned a top score

Forbes 2024 Net Zero Leaders

Forbes A top company for both women and diversity in 2024.

Operating across every dimension of commercial real estate, CBRE sees more so you can do more.

Industrial Advisory Services

INDUSTRIAL EXPERIENCE ACROSS **35+ COUNTRIES**

- Successfully delivered assignments **across emerging Industrial markets**
- Robust Industrial Advisory platform with Global Experience

PROJECTS RANGING FROM **100 HA TO 20,000 HA**

- Experience in **greenfield & brownfield projects ~ sector specific** Industrial clusters to **mega/ large** scale integrated projects
- Experience across wide-ranging Industrial infrastructure projects

DEVELOPERS CORPORATES PLANNERS INVESTORS MULTILATERAL

- Handholding Industrial projects from **conceptualization to delivery** for both public and private sector institutions
- Partnering across the entire project life cycle

Diversified Global Experience

MIDDLE EAST

KSA
- JEDDAH AIRPORT ECONOMIC ZONE
- LOGISTICS & DISTRIBUTION HUB EASTERN PROVINCE
- RIYADH BIOTECH CITY
- INTEGRATED LOGISTICS PARK, JEDDAH

UAE
- JEBEL ALI TERMINAL 1 REDEVELOPMENT PROJECT
- ABU SHABI DERIVATIVES AND CONVERSION PARK
- ABU DHABI REGIONAL PLAN ECONOMIC STRATEGY
- RAS AL KHAIMAH ECONOMIC ZONE
- SHARJAH AIRPORT FREE ZONE
- FUJAIRAH FREE TRADE ZONE
- INDUSTRIAL CITY OF ABU DHABI (ICAD)
- ABU DHABI OIL & GAS SERVICES COMPLEX

OMAN
- GREEN HYDROGEN DERIVATIVE PARK, DUQM
- INDUSTRIAL CLUSTERS IN SHINAS AND KHASAB
- 'AIRPORT INDUSTRIAL CITY' - SALALAH AIRPORT

AFRICA

SENEGAL
- DAKAR SPECIAL ECONOMIC ZONE

GUINEA
- CONAKRY ECONOMIC TOWNSHIP

KENYA
- KENGEN INDUSTRIAL PARK IN NAIVASHA

REPUBLIC OF CONGO
- POINTE NOIRE PORT BASED SEZ
- OYO OLLOMBO AGRO SEZ

NIGERIA
- OGUN AIRPORT ECONOMIC ZONE
- LAGOS FREE TRADE ZONE
- EKITI SPECIAL AGRO INDUSTRIAL PROCESSING ZONE
- INTEGRATED ECONOMIC CITY OF ABIA
- SEZS KWARA AND MAKURDI

GABON
- NATIONAL INDUSTRIAL DEVELOPMENT PLAN

IVORY COAST
- PORT BASED ECONOMIC ZONE

EGYPT
- ALEXANDRIA INDUSTRIAL ZONE
- INDUSTRIAL PARK - BORG EL ARAB

TANZANIA
- INVESTMENT ADVISORY FOR GOVERNMENT FUND

SOUTH & SOUTH EAST ASIA

INDONESIA
- JAMBI RIVER PORT SEZ & INDUSTRIAL PARK

MYANMAR
- THILAWA SEZ
- KYAUK PHU SEZ

SRI LANKA
- GREATER HAMBANTOTA REGION

VIETNAM
- LONG HAU INDUSTRIAL PARK
- YEN BINH INDUSTRIAL PARK
- FUTALAND INDUSTRIAL TOWNSHIP

LAOS
- VIENTIANE SMART INDUSTRIAL CITY DEVELOPMENT

SINGAPORE
- INDUSTRIAL PARK AT TERENGGANU
- PERAK HI-TECH INDUSTRIAL PARK

MALAYSIA
- HIGH - TECH SPACE CITY

CAMBODIA
- REAM CITY, SIHANOUKVILLE

INDIA

- DMIC PERSPECTIVE PLAN
- NICDC - MANUFACTURING CLUSTER IN AGRA, JODHPUR PALI, ORVAKKAL, PALAKKAD, DHARWAD, AURANGABAD, RATLAM, PITHAMPUR, & OTHERS
- MARUBENI NEXGEN INDUSTRIAL PARK
- ECONOMIC MASTERPLANNING FOR SAMRUDDHI MAHAMARG, MAHARASHTRA
- AURIC - FOOD PARK IN MAHARASHTRA
- KHED CITY, PUNE
- DAHEJ INDUSTRIAL AREA, GUJARAT
- RAJKOT AVIATION PARK, GUJARAT
- ARETE INDUSTRIAL PARK, VAPI, GUJARAT
- ADANI MUNDRA PORT SPECIAL ECONOMIC ZONE
- BUNDELKHAND INDUSTRIAL AREA, UTTAR PRADESH
- WANDA INDUSTRIAL NEW CITY - HARYANA
- TATA GOPALPUR SEZ, ODISHA
- JINDAL STEEL SEZ, ODISHA
- AMRAVATI PLAN - NEW CAPITAL OF ANDHRA PRADESH
- GMR KRISHNAGIRI SEZ, KAKINADA SEZ
- GMR HYDERABAD INTERNATIONAL AIRPORT
- KULPI SEZ, WEST BENGAL
- DANKUNI INDUSTRIAL TOWNSHIP, WEST BENGAL
- VARAPATTI DEFENCE PARK, TAMIL NADU
- SULUR AEROSPACE PARK, TAMIL NADU

EASTERN EUROPE & CIS

RUSSIA
- TOMSK INNOVATION PARK
- PSKOV MULTIPRODUCT INDUSTRIAL SEZ
- PSKOV FOOD PARK

KAZAKHSTAN
- ALMATY HI-TECH SEZ (PIT)
- ASTANA INDUSTRIAL & INNOVATION SEZ

SOUTH AMERICA

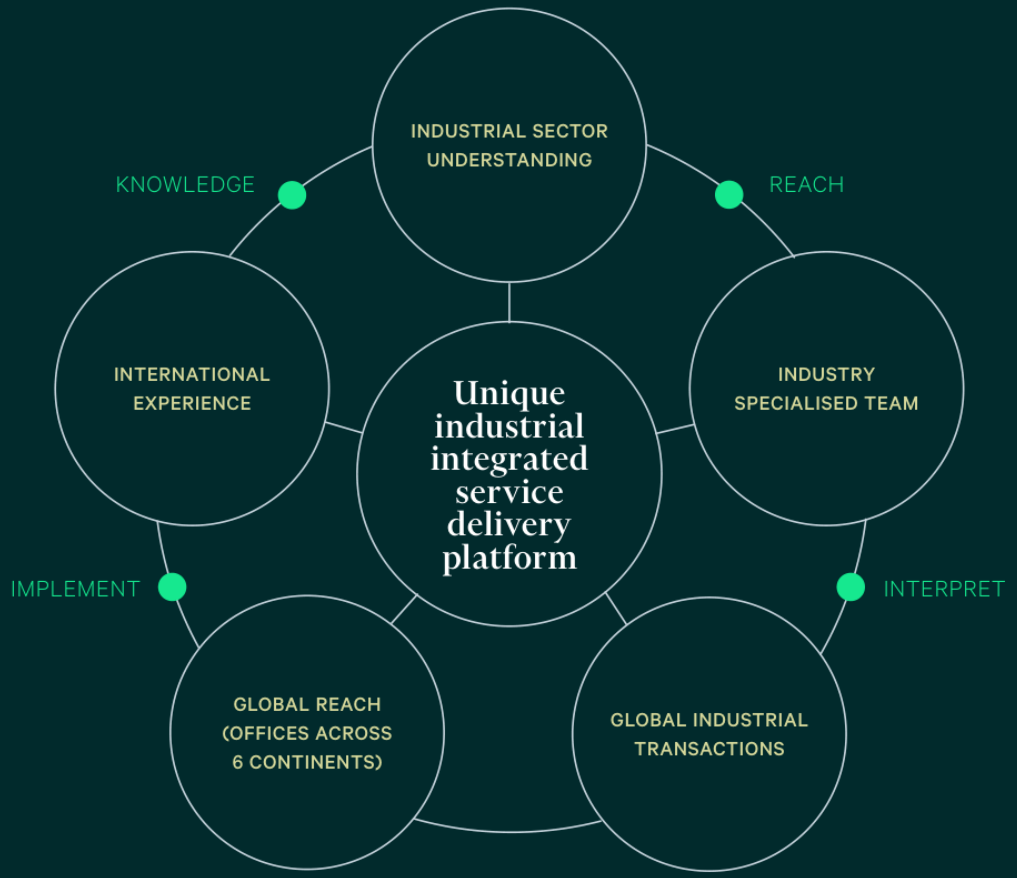
BRAZIL
- ITAJAI INDUSTRIAL INNOVATION PARK
- REGIONAL STRUCTURAL PLAN - SANTA CATARINA

NORTH AMERICA

MEXICO
- LAZARO CARDINAS SEZ

DOMINICAN REPUBLIC
- DOMINICANA FREE ZONE

Integrated Industrial Expertise Across Sectors



INDUSTRIAL & LOGISTICS

01
HIGH TECH PARKS & INNOVATION ZONES

02
INDUSTRIAL TOWNSHIP / ECONOMIC DEVELOPMENT OF CITIES

03
INDUSTRIAL CORRIDORS/ REGION

04
RESEARCH & DEVELOPMENT ZONE

05
PORT/AIRPORT INDUSTRIAL HUBS

06
SPECIAL ECONOMIC ZONES/ FREE ZONES

SECTORS

- Food Processing
- Energy
- Oil & Gas
- Chemical & Petrochemicals
- Pharmaceuticals
- Automotive
- Textiles
- Aerospace
- Defense
- Research & Development

Comprehensive Service Offering

INDUSTRIAL SECTOR OPPORTUNITIES STUDY

TECHNO-ECONOMIC VALIDATION STUDY

CLUSTER DEVELOPMENT ADVISORY

ORGANIZATION AND MANAGEMENT STRUCTURING WITH GOVERNANCE

INDUSTRIAL REAL ESTATE STRATEGY

POLICY EVALUATION AND INCENTIVES STUDY

VALUATION SERVICES

MARKETING STRATEGY AND INDUSTRIAL DEVELOPER OUTREACH

FEASIBILITY AND DEVELOPMENT STRATEGY

ASSET MONETIZATION STRATEGY AND PPP STRUCTURING

INVESTMENT RISK MONITORING

INDUSTRIAL CORRIDOR DEVELOPMENT STUDIES

INDUSTRIAL VALUE / VOLUME / CARGO TRAFFIC ASSESSMENTS

LOCATION STRATEGY

PLANT AND MACHINERY VALUATION

ECONOMIC MASTER PLANNING SERVICES

Industrial & Logistics Advisory Services

Our team collaborates across geographies & business lines to help clients with relocating, consolidating & expanding across India.

From land and built-up space for industrial & warehousing parks, manufacturing units, cold chains, Data Centres, R&D labs, F&B Kitchens and Repair & Return centres we offer a complete suite of services.

These including property marketing, landlord/tenant representation, location advisory, lease v/s buy analysis, acquisition & disposition, portfolio analysis and rent benchmarking.

The industrial investment sales team assists investors and developers with strategic advisory in terms of joint ventures & development, pre-leased asset sales, sale & lease back and forward purchase of industrial and logistics assets.

3,900+
ACRES OF LAND ACQUIRED OR DISPOSED FOR CLIENTS

TRANSACTIONS IN
95+ CITIES

73+
MNSF LEASED ON BEHALF OF CLIENTS

TRANSACTIONS CLOSED IN 2024
140+

75+
PROFESSIONALS

Service Offering

- Ready to move in Warehouse & Industrial Lease
- Built-to-Suit Warehouse & Industrial Lease
- In-city distribution & Last Mile Delivery Centres
- Lease of Industrial Kitchens, Repair & Return Services and R&D Labs
- Land for Parking Yards
- Leasing of Cold Chain Assets
- Land for Data Centres
- Land Acquisition & Disposition for end-users
- Site Selection Advisory
- Portfolio analysis and rent benchmarking
- Acquisition of Pre-leased Industrial & Warehousing Assets
- Sale & Leaseback
- Joint Development / Joint Venture for Integrated Industrial & Logistics Parks

Track Record:

2024	**282 acres** Land (Acquisition/disposition/lease) **~10 MnSF** of lease
2023	**748 Acres** Land (Acquisition/disposition/lease) **~ 10 MnSF** of Leasing
2022	**445 Acres** Land (Acquisition/disposition/lease) **~8.5 MnSF** of Leasing
2021	**~296 Acres** Land (Acquisition/disposition/lease) **~8.34 MnSF** of Leasing
2020	**~192 Acres** Land (Acquisition/disposition/lease) **~7.42 MnSF** of Leasing
2019	**188 Acres** Land (Acquisition/disposition/lease) **7.7 MnSF** of Leasing
2018	**261 Acres** Land (Acquisition/disposition/lease) **5.1 MnSF** of Leasing
2017	**216 Acres** Land (Acquisition/disposition/lease) **1.4 MnSF** of Leasing
2016	**216 Acres** Land (Acquisition/disposition/lease) **1.4 MnSF** of Leasing

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