Scaling New Heights
Vizag-Chennai Industrial Corridor, India’s First Coastal Corridor

The Vizag–Chennai Industrial Corridor (VCIC) spans more than 800 kilometers of India’s eastern coastline and is part of the country’s East Coast Economic Corridor. It can play a vital role in unifying the large domestic market as well as integrate the Indian economy with the dynamic global value chains of Asia and drive India’s Act East policy. VCIC will also be an important component of the government’s Make in India campaign to attract foreign investors and encourage the creation of manufacturing hubs in the country.

VCIC is expected to spur growth by augmenting existing investment in world-class transport networks, infrastructure, and industrial and urban clusters that are supported by a robust institutional framework and a competitive business environment. By linking areas that are lagging in development with dynamic industrial and urban clusters, VCIC will create employment opportunities that alleviate poverty and reduce inequality.

As a coastal corridor, VCIC can provide multiple access points to international gateways. Greater connectivity and economic integration between South Asia and the rest of Asia is likely to contribute significantly to development and foster regional cooperation as well.

About the Asian Development Bank

ADB’s vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region’s many successes, it remains home to the majority of the world’s poor. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.
SCALING NEW HEIGHTS
VIZAG-CHENNAI INDUSTRIAL CORRIDOR
INDIA’S FIRST COASTAL CORRIDOR

Sabyasachi Mitra • Rana Hasan • Manoj Sharma
Hoe Yun Jeong • Manish Sharma • Arindam Guha

MAY 2016
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India—the world’s third largest economy in purchasing power parity terms—has emerged as a global growth engine with promising prospects for the future. In order for India to sustain its growth momentum and translate economic gains into welfare improvements, it must accelerate its manufacturing-based industrial development.

South Asia is favorably positioned to link west and east Asia and plays a unique role in regional economic development and integration. With its location and prodigious demographic dividend, South Asia has enormous potential for economic prosperity. As India and its neighbors in the region strive for sustainable development, they will need to promote structural transformation, bridge the infrastructure gap, further integrate with the global economy, and absorb millions of new entrants into the workforce annually. Economic corridors as a development strategy can help India achieve these goals.

This book intends to aid policymakers in understanding the economic corridor development strategy that India is pursuing in its quest to spur manufacturing and create decent jobs. Economic corridors can be viewed as spatial planning tools that integrate and synergize industry, infrastructure, logistics and urbanization through careful planning over a long-term horizon. The Asian Development Bank’s support to economic corridor initiatives in India can also be a useful guide for other South Asian economies.

This book details the development of India’s East Coast Economic Corridor (ECEC) by focusing on its initial phase, the Vizag–Chennai Industrial Corridor. As India’s first coastal corridor, ECEC is based upon a distinctive port-led industrialization effort, differentiating it from other industrial corridors across the country. ECEC’s long coastline and strategically located ports provide an opportunity to develop multiple international gateways to connect India with global markets and value
chains. Regulatory reforms that support private investment and trade are also given due attention.

I extend my appreciation to the team leaders of this initiative, Sabyasachi Mitra, Rana Hasan, Manoj Sharma, and Hoe Yun Jeong; the India Resident Mission; and South Asia Department staff and consultants for adding to our knowledge and understanding of economic corridor development.

This publication underlines the Asian Development Bank’s intention to provide developing member countries with knowledge products needed to maximize development effectiveness. This book is an outcome of the Asian Development Bank’s commitment to responding to the region’s infrastructure investment needs in order to help unlock its full economic potential. I am certain that this book will provide valuable policy insights to governments, academics, private sector and other key stakeholders across the region.

Wencai Zhang
Vice-President (Operations 1)
Asian Development Bank
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The Study Team

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**Abbreviations**

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<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
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<td>AKIC</td>
<td>Amritsar–Kolkata Industrial Corridor</td>
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<td>BAU</td>
<td>Business as Usual</td>
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<td>BIS</td>
<td>Business-Induced Scenario</td>
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<td>BMEC</td>
<td>Bengaluru–Mumbai Economic Corridor</td>
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<td>CBIC</td>
<td>Chennai–Bengaluru Industrial Corridor</td>
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<tr>
<td>PRC</td>
<td>People’s Republic of China</td>
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<td>DMIC</td>
<td>Delhi–Mumbai Industrial Corridor</td>
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<td>ECD</td>
<td>economic corridor development</td>
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<td>ECEC</td>
<td>East Coast Economic Corridor</td>
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<td>FDI</td>
<td>foreign direct investment</td>
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<td>FY</td>
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<td>GDP</td>
<td>gross domestic product</td>
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<td>GVC</td>
<td>global value chain</td>
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<tr>
<td>GW</td>
<td>gigawatt</td>
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<td>ICT</td>
<td>information and communications technology</td>
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<tr>
<td>km</td>
<td>kilometer</td>
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<td>kwh</td>
<td>kilowatt hour</td>
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<td>Abbreviation</td>
<td>Description</td>
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<td>M&amp;A</td>
<td>mergers and acquisition</td>
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<tr>
<td>MSMEs</td>
<td>micro-, small, and medium-sized enterprises</td>
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<tr>
<td>MU</td>
<td>mega unit (1 MU = 1,000,000 kwh)</td>
</tr>
<tr>
<td>MW</td>
<td>megawatt</td>
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<tr>
<td>RCA</td>
<td>revealed comparative advantage</td>
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<td>SEZ</td>
<td>special economic zone</td>
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<td>VCIC</td>
<td>Vizag–Chennai Industrial Corridor</td>
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Lessons from the Past, A Vision of the Future

“The Ashoka wheel in the centre of the white is the wheel of the law of dharma... The wheel denotes motion. There is death in stagnation. There is life in movement. India should no more resist change, it must move and go forward. The wheel represents the dynamism of a peaceful change...”

—Vice-President S. Radhakrishnan at the adoption of the national flag in the Constituent Assembly, 1947

Toward a New Approach to Rapid Industrialization

India’s economy has taken significant strides in the past 2 decades. It is now time to build on the economic gains and tackle the remaining barriers to growth, generate more jobs for an expanding labor force, raise productivity, and expand economic opportunities for all. While the services sector has anchored India’s recent growth, the manufacturing sector now has to be the engine of growth and jobs. Higher productivity and dynamism in the manufacturing sector will shift resources to more productive sectors and lead to greater innovation.

Pursuing sustainable and inclusive growth also requires invigorating the private sector, which has been vital to growth, employment generation, and capital formation.\(^1\) Government, in turn, will need to persevere with economic reforms and resolve complex policy and regulatory issues that affect private investment.

\(^1\) The private sector in India accounted for 66% of gross domestic product (GDP) growth in the 1980s and 1990s, and more than 80% in the 2000s. The private sector has also accounted for more than 90% of employment growth since the 1980s and more than 75% of domestic capital formation over the same period, making it the main driver of investment in India.
India will have to take the lead in integrating itself and its neighbors with East and Southeast Asia, and in expanding its links with the rest of the world. India’s potential to serve as the region’s primary engine for economic growth and integration remains to be fully realized. Significant trade reforms and the subsequent rise in trade flows have led to India’s integration with the developed economies of Europe and North America. Trade linkages among countries in South Asia and with the rest of Asia, however, are relatively low. India remains on the periphery of the vibrant global value chains (GVCs) that have been a driving force of manufacturing and overall economic growth in East and Southeast Asia.\(^2\)

How can India fast track economic growth that is inclusive and sustainable? How can it achieve rapid industrialization and develop robust infrastructure to increase productivity, competitiveness, and access to services; promote investments in infrastructure,

logistics, urban services, and skills to create jobs; expand regional connectivity to foster regional trade and investment; and enhance environmental sustainability through investments in water resources management and the introduction of new technologies and low-carbon solutions?

One effective policy instrument that integrates industry, infrastructure, urban services and the institutional and regulatory edifice and which India is pursuing in a big way—is the development of economic or industrial corridors. Economic corridor development (ECD) entails constructing world-class infrastructure, typically aligned to a major transport network; connecting urban clusters complementing vibrant industrial zones; and providing a favorable and competitive environment for setting up businesses and facilitating the efficient movement of goods and people.

The government’s Make in India initiative is an integrated growth strategy that seeks to address the country’s development challenges through the creation of five economic corridors that will serve as the backbone of a globally competitive manufacturing sector. The corridors will be supported with policy initiatives to spur manufacturing and promote urbanization, and growth will be boosted by logistical facilities that are integrated with 100 smart cities and world-class infrastructure network that links developed and backward regions of the country.

This book provides policymakers with the framework for developing India’s first coastal economic corridor, the East Coast Economic Corridor (ECEC) and lays out the plan for the first phase of the ECEC, the Vizag–Chennai Industrial Corridor (VCIC). ECEC aligns with with the government’s Make in India and Sagarmala (port-based development) initiatives. The discussion about these crucial policy initiatives will lead into a review of the ECD strategy as it is being implemented in India, including the status of ongoing economic corridor projects across the country. ECEC, the country’s first coastal corridor, and its initial phase, VCIC, are then presented.

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3 Vizag is the commonly used name for Visakhapatnam, the largest city in the state of Andhra Pradesh. Vizag has developed into a financial and commercial hub and a major tourist destination.
Driving Economic Growth: Boosting India’s Manufacturing Performance

India has undertaken significant reforms in the past 2 decades in its manufacturing sector. But these efforts have neither yielded a sufficiently large increase in output nor met the high demand for decent jobs from a growing labor force. Modern infrastructure, accelerated financial sector development, and more flexible labor market regulations have been identified as necessary prerequisites for rapid industrialization. More importantly, reducing the cost of doing business by reforming regulations and improving institutional quality will facilitate the channeling of private investment into the sectors that provide maximum employment opportunities.

India’s manufacturing, with great untapped potential, has significant capacity to create good jobs.

The services sector, the second largest employer in the country after agriculture, is a major contributor to India’s gross domestic product (GDP). Services have assumed the role of the country’s most dynamic sector in a manner normally reserved for manufacturing in a developing country experiencing rapid economic growth. The sector has become a major exporter of information technology services, business outsourcing services, and software workers largely by capitalizing on the skilled segment of the labor force. Yet, while services have been the major source of India’s recent economic growth, accounting for nearly two-thirds of output, the sector comprises less than one-third of the country’s labor force.

The story of India’s services sector is a compelling one; however, this book will instead focus on manufacturing, given the country’s untapped potential in a sector with significant capacity to create good jobs. To lift hundreds of millions of its citizens out of poverty and place India on the path of sustainable and inclusive economic development, both the manufacturing and services sectors have to grow much faster than agriculture. This structural transformation needs to be supported by rapid urbanization as

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India’s industrial potential is visible in the sheer range of manufactured products, which include relatively sophisticated chemicals, pharmaceuticals, and auto components. Yet, despite the manufacturing sector’s growing diversity and sophistication, India’s manufacturing performance still lags behind that of its neighbors. Malaysia roughly tripled its share of manufacturing value-added in GDP from 1960 to 2014 to reach about 24% while Thailand’s share increased from 13% to 33% over the same period. In contrast, India’s manufacturing value-added has remained stagnant at around 15% of GDP over the last 5 decades (Figure 1.1a). Updated figures point to a slightly higher share of around 17% of GDP on average from fiscal year (FY) 2012–2013 to FY 2014–2015.

Furthermore, India lags behind comparator countries in terms of job creation in the manufacturing sector (Figure 1.1b), especially if employment in formal manufacturing, where relatively higher-paying jobs are located, is considered. Despite its sizeable domestic market and labor force, India has also made little progress in terms of its share of international manufacturing trade (Figure 1.1c). Lastly, India’s bid for foreign direct investment (FDI) since the turn of the century has not kept pace with that of the People’s Republic of China (PRC) (Figure 1.1d).7

7 Latest data on investment are, nevertheless, encouraging. Net FDI inflows have grown from $21.9 billion in April–December 2014 to $27.7 billion over the same period in 2015.
**FIGURE 1.1: INDIA’S MANUFACTURING AT A GLANCE**

**Figure 1.1a: Manufacturing Value Added, 1960–2014 (% of GDP)**

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<td>1960</td>
<td>34</td>
<td>14</td>
<td>9</td>
<td>8</td>
<td>13</td>
</tr>
</tbody>
</table>

PRC = People’s Republic of China, GDP = Gross Domestic Product.

Note: For year 2014, 2013 data is used for PRC.


**1.1b: Share of Manufacturing in Total Employment, 1980–2010 (%)**

<table>
<thead>
<tr>
<th>Year</th>
<th>PRC</th>
<th>India</th>
<th>Indonesia</th>
<th>Malaysia</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>13.8</td>
<td>9.1</td>
<td>9.2</td>
<td>13.7</td>
<td>8.3</td>
</tr>
<tr>
<td>1990</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>19.2</td>
<td>11.6</td>
<td>12.1</td>
<td>17.7</td>
<td>14.1</td>
</tr>
</tbody>
</table>

PRC = People’s Republic of China.

1.1c: Share in World Manufacturing Trade, 1980–2013 (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>PRC</th>
<th>INDIA</th>
<th>INDONESIA</th>
<th>MALAYSIA</th>
<th>THAILAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>13.28</td>
<td>1.52</td>
<td>0.74</td>
<td>1.13</td>
<td>1.35</td>
</tr>
<tr>
<td>2010</td>
<td>11.64</td>
<td>1.45</td>
<td>0.71</td>
<td>1.25</td>
<td>1.29</td>
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<tr>
<td>2000</td>
<td>4.07</td>
<td>0.58</td>
<td>0.70</td>
<td>1.53</td>
<td>1.03</td>
</tr>
<tr>
<td>1990</td>
<td>1.79</td>
<td>0.51</td>
<td>0.53</td>
<td>0.80</td>
<td>0.82</td>
</tr>
<tr>
<td>1980</td>
<td>0.95</td>
<td>0.47</td>
<td>0.34</td>
<td>0.43</td>
<td>0.29</td>
</tr>
</tbody>
</table>

PRC = People’s Republic of China.


1.1d: Foreign Direct Investment Inflow in Manufacturing ($ million)

<table>
<thead>
<tr>
<th>Year</th>
<th>PRC</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>30,907</td>
<td>2,998</td>
</tr>
<tr>
<td>2005</td>
<td>42,453</td>
<td>3,359</td>
</tr>
<tr>
<td>2010</td>
<td>49,591</td>
<td>14,939</td>
</tr>
<tr>
<td>2014</td>
<td>39,939</td>
<td>34,000</td>
</tr>
</tbody>
</table>

PRC = People’s Republic of China.

Notes: Data for India are for secondary sector, which includes food, beverage, tobacco, textiles, clothing, and pharmaceuticals, among others.

Unleashing Growth with the Right Policy Mix

Indian manufacturing provides a small contribution to GDP compared with economies in East and Southeast Asia. The country’s manufacturing sector is hamstrung on a national scale by inadequate infrastructure (e.g., poor transport logistics and unreliable power supplies); a difficult regulatory climate with authority wielded at various levels by central, state, and local governments, and by multiple agencies at the same level; poor access to developable land; limited access to credit, particularly for smaller businesses; and a lack of the skilled workforce required in modern economies.

These constraints have stymied attempts to invigorate domestic manufacturing supply chains and link them to global value chains (GVCs). Removing these constraints will help unify internal markets and strengthen the nation’s vast domestic market as well as allow Indian companies to connect to GVCs and capture a greater share of the global market.8

The problem dates to the 1970s when India’s trade and industrial policy regime was one of the most restrictive in the world.9 A process of gradual reform that was initiated in the early 1980s and culminated in 1991 dismantled much of the import licensing and industrial licensing systems. These economic reforms had the desired positive effect on manufacturing performance, enabling the sector to break out of the stagnation witnessed in the prereform period. Nevertheless, the manufacturing sector continues to play a lesser role than the services sector. India has also not been able to export labor-intensive goods to the same extent as the PRC due to policy impediments such as restrictive labor laws that create a strong disincentive for firms in the organized sector to expand.

Recognizing these constraints, the Government of India announced the National Manufacturing Policy (NMP) in 2011 with the objectives of increasing manufacturing’s share of GDP to 25% and creating 100 million

jobs within a decade. The NMP seeks to rationalize and simplify business regulation; formulate an “exit policy” that balances firms’ needs for adjusting employment levels in response to market conditions with workers’ needs for income security; develop financial and institutional mechanisms that promote technological advances, especially for micro, small, and medium-sized enterprises (MSMEs); promote large-scale infrastructure development; and support clustering by setting up National Investment and Manufacturing Zones.

In an effort to promote industrialization, upgrade infrastructure, set in motion the process of urban transformation, and provide an impetus to international trade, the current government has unveiled significant policy initiatives since assuming power in May 2014. Federal government programs like the Make in India initiative, Sagarmala initiative, Smart City Mission, Atal Mission for Rejuvenation and Urban Transformation, and Skill India embody key reforms targeted to ramp up infrastructure, improve the business environment to accelerate industrialization, make India an attractive destination for FDI, promote sustainable development of cities and towns, and ensure training for India’s unemployed youth for improved job prospects and employability.

The Government of India announced a National Manufacturing Policy in 2011 with the objectives of increasing manufacturing’s share of GDP to 25% and creating 100 million jobs by 2022.
The Make in India initiative was launched in 2014 to support the country’s industrialization efforts by encouraging global firms to set up manufacturing bases in India. The campaign identifies ECD as a policy instrument to increase the manufacturing sector’s contribution in India’s GDP (Box 1.1). A new National Industrial Corridor Development Authority (NICDA) is being formed to coordinate, integrate, monitor, and supervise development of all industrial corridors. To further provide a boost to industrial development, the government has approved 21 industrial projects under the Modified Industrial Infrastructure Upgradation Scheme with an emphasis on the use of recycled water through zero liquid discharging systems and central effluent treatment plants.

India’s Sagarmala initiative aims to support and enable port-led development of the country’s long coastline.

India’s Sagarmala initiative aims to support and enable port-led development of the country’s long coastline through policy and institutional reforms, development of port infrastructure, and the building of a multimodal transport network for efficient movement of cargo to and from the hinterlands. This approach draws inspiration from the success of East and Southeast Asian economies in using coastal zones and ports to support industrialization and integration with global markets. Another initiative, the Bharat Mala project, aims to improve connectivity in the border areas, including coastal boundaries encompassing about 7,000 kilometers (km) of National Highways.

As part of improving the ease of doing business, the government launched an e-Biz portal in 2014 to integrate 14 regulatory permissions in one place and facilitate the starting and operating of a business. The government has also implemented a unified online portal, Shram Suvidha, to enable industrial units to obtain various labor-related clearances through a single portal. Other reforms include the simplification of industrial license forms known as Industrial Entrepreneurs Memorandum, an extension of validity of industrial license and security clearances, and a reduction in documents required to export and import from seven to three. In order to make the regulatory environment attractive for foreign investment, the government eased FDI norms in 15 major sectors, including defense, pension, coal mines, construction, operation and

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10 The eBiz portal is an online platform that aims to provide a Single Window clearance mechanism through which businesses can apply for all required start-up approvals, thereby minimizing red tape and improving transparency.
Box 1.1: Come, Make in India

The Make in India initiative is a comprehensive effort by the government to encourage global firms to set up manufacturing bases in India. It focuses on 25 industries, including telecommunications, renewable energy, and small cars. It also involves a global marketing campaign to promote India as an investment destination with a predictable, stable, and competitive tax regime; and a simplified regulatory environment.

In December 2014, a number of executive orders were issued to ease investment restrictions and allow the central and state governments to buy land for the development of industrial corridors. These ordinances enable states to participate in competitive federalism in which states vie with one another to design and implement successful governance initiatives.

Key legislations were passed in 2015 with regard to foreign investment in the insurance industry, and mining. The Insurance Laws Amendment Act, 2015 raised the allowed level of foreign ownership in an Indian Insurance company to 49% and permitted foreign reinsurers to establish branches in India. The Coal Mines Bill, 2015 and the Mines and Minerals (Development and Regulation) Amendment Bill, 2015 opened the sector for commercial mining to facilitate the auction of over 200 cancelled coal blocks.

The Make in India campaign also seeks to advance labor, land, and tax reforms. The central government is committed to updating India’s decades-old labor laws and its land acquisition law. More recently, the government has been pushing labor reforms to streamline India’s 44 separate labor laws into five codes covering (i) wages, (ii) conditions, (iii) social security, (iv) industrial relations, and (iv) training. A computerized system of inspections was also introduced to remove the need for labor inspectors to visit business establishments.

A proposal to amend the Land Acquisition and Rehabilitation and Resettlement Act, 2013 to facilitate land acquisition for industrial corridors, public–private partnership projects, and infrastructure projects is also a key priority for the government. The central government also plans to roll out a goods and services tax (GST). The GST will subsume various levies (e.g., excise, service, and sales taxes) into a single indirect tax for the entire country.

While the Make in India is a very promising initiative, in order to reap its full benefits, coordinated reforms and multiparty support are required at the central and state levels.

* Two amendments to existing labor laws have been passed by both houses of Parliament. The Apprentices (Amendment) Bill, 2014 encourages employers to provide apprenticeship training schemes by adding 500 new trades and removing the risk of prosecution for certain violations. The Labour Laws (Exemption from Furnishing Returns and Maintaining Registers by Certain Establishments) Amendment Bill, 2011 raised from 10 to 40 the number of employees a firm can have and still be classified as small for tax purposes.

maintenance of specified railway activities, coffee, rubber, cardamom, and palm oil and olive oil plantations, among others. The government has also taken a positive stance on retrospective taxation by not levying a minimum alternative tax on foreign portfolio investors and has deferred implementing the General Anti-Avoidance Rules. In addition, the government is working toward implementing a bankruptcy code to hasten the pace of liquidation in stress cases. To boost trade, the Foreign Trade Policy, 2015–2020 aims at doubling exports to $900 billion by FY 2019–2020. The policy's focus is on supporting the manufacturing and services sectors, with a special emphasis on trade facilitation and ease of doing business.

Through several programs, the government plans to transform cities and towns to ensure better living conditions. To support urban rejuvenation, India has launched three major urban development initiatives: Smart Cities Mission, Atal Mission for Rejuvenation and Urban Transformation, and Housing for All (Urban). Through these programs, the government plans to transform cities and towns to ensure better living conditions. These cities will have adequate water supplies, better electricity supplies, sanitation, solid waste management, affordable housing, efficient urban mobility and public transport, robust IT connectivity and digitalization, good governance (especially e-governance and citizen participation), storm water drains to reduce flooding, and health and education facilities.

Under Skill India, the National Policy on Skill Development and Entrepreneurship 2015 seeks to meet the challenge of training over 400 million people in India in different skills by 2022. The government also launched a skill training scheme to mobilize a large number of Indian youth to take up outcome-based skill training to improve their employability. The Startup India campaign, launched in January 2016, aims to boost entrepreneurship and job creation by providing fiscal incentives to startup ventures, promoting their access to institutional financing, and streamlining regulations in business establishment and operation.

**Economic Corridors—Instruments of Growth**

A corridor is a spatial development initiative, primarily defined as a route along which goods and people move. The efficiency of this movement contributes to and stimulates economic development, existing and planned, along the route. These movements often involve more than one
mode, which are used as alternatives (multimodal) and/or in sequence (intermodal). While it is possible to think of a corridor as simply a transport link along which economic activity takes place, this does not provide any insight into the performance of the corridor. The corridor is thus usually defined in terms of a route bounded by specific nodes.

From an economic perspective, corridors can also be defined in terms of the type of economic activities taking place within a bounded geography that contribute to both the development of domestic markets as well as global trade. Since most of the work on corridors has focused on international trade, one of the nodes is usually an international gateway, in most cases a seaport or a land crossing. The other node is usually a locus for the distribution or collection of the goods moving through the corridor. It may be a hub through which goods are distributed or collected from a transport network. Alternatively, it may be a cluster where the goods are produced or consumed.

Depending on the economic activities supported, corridors can be classified as domestic, regional, or international. Although most corridors carry some mix of these types of economic activities and trade, an analysis of the efficiency of a corridor requires that these activities be considered separately. As corridors often include intermediate nodes that generate significant volumes of traffic, the analysis of the performance of the corridor is based on the end-to-end movements.
The use of ECD as a planning concept is old, but turning it into a multidimensional concept and instrument for planned spatial economic development emerged in the early 1990s in both Asia and Europe.\textsuperscript{11} ADB’s Greater Mekong Subregion project for regional cooperation and the Maastricht Treaty to integrate Europe played a pivotal role in transforming the old concept of transport and urban corridors into “megacorridors.”\textsuperscript{12}

Drawing from these experiences and relevant literature on transport and economic geography, we can define an economic corridor as having three complementary components: a trade and transport corridor, industrial production clusters producing goods for consumption in the surrounding region and for international trade, and urban centers (Figure 1.2). Urban centers are not only major markets for goods manufactured in the

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1.2.png}
\caption{Components of a Traditional Economic Corridor}
\end{figure}


production centers or imported through international gateways, but also a source of labor, technology, knowledge, and innovation.

An economic corridor involves the creation of an efficient multimodal transport network within a defined geography supported by quality infrastructure, logistics, a policy framework that facilitates doing business and setting up distribution networks that link production centers, urban centers, and international gateways. The integration of infrastructure with trade, investment, and overall economic potential is envisioned to enhance the competitiveness of a country or region. This, in turn, will contribute to developing a sound industrial base by attracting investments into manufacturing, both for domestic and export markets.

Economic corridors facilitate growth by easing infrastructure bottlenecks, improving access to markets, stimulating trade and investment, and boosting productivity and efficiency. Over the long term, corridors contribute to economic diversification and job creation. Figure 1.3 captures the essential building blocks of an economic corridor as well.

**Figure 1.3: The Building Blocks of an Economic Corridor**

Source: Study team analysis.
The rise of GVCs has provided modern ports and global shipping and logistical companies a critical role in shaping the dynamics of national and global trade. as the drivers needed for a successful creation of an economic corridor. This basic framework shapes the growth of private-sector-driven or planned development of economic corridors.

This book outlines a framework for developing the ECEC, an economic corridor along India’s east coast extending from Kolkata to Tuticorin. ECEC is India’s first coastal economic corridor. In this framework, a port-led industrialization strategy forms the bedrock of India’s coastal economic corridor.

The rise of GVCs has provided modern ports and global shipping and logistical companies a critical role in shaping the dynamics of national and global trade. Today, a port’s strategic advantage is not determined by location but by its ability to embed in supply chains and improve its efficiency within these supply chains and extract value from them. Ports, through their critical role in GVCs, provide a source of value creation for companies and more generally contribute to the economic development of a location through infrastructure, transport linkages with the hinterland, logistics, distribution facilities, and other related services (Figure 1.4).

Figure 1.4: Framework for a Coastal Economic Corridor

Source: Study team analysis.

As is evident in this framework, proximity and/or access to a port will be a defining criterion for the selection of industrial clusters within an economic corridor. Key elements to develop a successful coastal economic corridor include the presence of industries, whether existing or new ones with the potential to link up with GVCs; efficient multimodal and intermodal transportation networks between industries and ports, both along the coast as well as with the hinterland; and logistics and distribution facilities supported by dynamic urban clusters and other related utilities.

Even more importantly, underpinning these frameworks is a robust institutional and policy framework to support a successful economic corridor. Key institutional and regulatory interventions that need to be put in place relate to (i) ports, shipping, and trade facilitation; (ii) easing the process of setting up and closing a business; (iii) streamlining regulations to improve the business environment; and (iv) synchronizing industrial–urban development to ensure that jobs are available and people’s living needs and aspirations are met (Figure 1.5).

**Figure 1.5: Regulatory Framework for Economic Corridors**

Source: Study team analysis.
The success or failure of an ECD strategy is largely influenced by political will and participation of the private sector.

Other key factors include a high level of political commitment at various levels, a strong role for the private sector in the conceptualization and implementation stages, institutional mechanisms to coordinate diverse stakeholders, detailed and comprehensive macro- and sector-level analyses, and a long time horizon for implementation. Therefore, the success or failure of an ECD strategy is largely influenced by economic policy makers and private sector stakeholders.

### Status of Economic Corridors

The Delhi–Mumbai Industrial Corridor (DMIC) is the country’s first and most advanced-stage economic corridor. DMIC is a 1,483-km long freight corridor that links the country’s two most populous cities. DMIC is in its first phase development (2014–2019). The corridor traverses six states, of which Gujarat, Maharashtra, and Uttar Pradesh are among India’s top five industrialized states, together contributing over 40% of the national industrial output. The influence area of the corridor covers more than 40 towns and cities including Delhi, Jaipur, Ahmedabad, Mumbai, and Pune.

Aside from DMIC, India has four other major economic corridors at various stages of development: Amritsar–Kolkata Industrial Corridor (AKIC), Bengaluru–Mumbai Economic Corridor (BMEC), Chennai–Bengaluru Industrial Corridor (CBIC), and ECEC. Among them, ECEC stands out as it hosts several ports that serve as international gateways and critical links in domestic and global supply chains. VCIC is the first phase of ECEC.

AKIC, BMEC, CBIC, and VCIC are in various stages of concept planning, master planning, and special purpose vehicle formation and financing. Table 1.1 details the current status of each of these corridors.

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15 Of course, a corridor’s inherent economic potential is also of critical importance. For a variety of geographic and historic reasons, certain areas are simply better than others for production, investment, and living.
16 Although VCIC overlaps with CBIC, this book does not examine the areas under CBIC.
17 Ports are a source of value creation for firms that provide services (e.g., logistics and packaging) to production clusters and distribution centers.
## Table 1.1: Economic Corridors in India

<table>
<thead>
<tr>
<th>No.</th>
<th>Corridor</th>
<th>Status /Industrial Nodes or Cities</th>
</tr>
</thead>
</table>
| 1.  | Delhi–Mumbai Industrial Corridor (DMIC)       | Status: Eight Nodes have been identified in the six DMIC States under Phase I by the Delhi–Mumbai Industrial Development Corporation. The master plans for all the nodes except Dadri Noida Ghaziabad Investment Region in Uttar Pradesh and Jodhpur Pali Marwar Industrial Area in Rajasthan have been completed and accepted by the state governments.  

Nodes/Cities: The following industrial city development projects are moving toward implementation: Ahmedabad–Dholera Special Investment Region, Gujarat (The first Engineering Procurement and Construction [EPC] project for roads and services has been awarded); Shendra–Bidkin Industrial Park, Maharashtra (The first EPC project for roads and services has been awarded); Integrated Industrial Township Vikram Udyogpuri near Ujjain, Madhya Pradesh; Integrated Industrial Township Greater Noida.  

| 2.  | Chennai–Bengaluru Industrial Corridor (CBIC)  | Status: Comprehensive regional perspective planning and master planning has been completed by the Japan International Cooperation Agency, the nodal agency. Three nodes have been identified for master planning. Discussions on special purpose vehicle formation and detailed engineering studies are underway.  

Nodes/Cities: Krishnapatnam (Andhra Pradesh), Tumkur (Karnataka), and Ponneri (Tamil Nadu)  

| 3.  | Vizag–Chennai Industrial Corridor (VCIC)      | Status: A Conceptual Development Plan has been completed with the assistance of the Asian Development Bank. A Regional Perspective Plan will be completed soon. Master planning will be undertaken for the identified four nodes, namely: Vizag, Kakinada, Gannavaram–Kankipadu, and Srikalahasti–Yerpedu.  

Nodes/Cities: Vizag, Kakinada, Gannavaram–Kankipadu, and Srikalahasti–Yerpedu  

| 4.  | Bengaluru–Mumbai Economic Corridor (BMEC)    | Status: A Perspective Plan has been completed by the Delhi–Mumbai Industrial Development Corporation, the nodal agency. One node has been identified for master planning.  

Nodes/Cities: Dharwad (Karnataka)  

| 5.  | Amritsar–Kolkata Industrial Corridor (AKIC)   | Status: The feasibility study for AKIC is underway.  

Nodes/Cities: data not available  

Source: Study team analysis.
East Coast Economic Corridor—India’s First Coastal Corridor

ECEC, which stretches from Tuticorin to Kolkata, is envisaged to be India’s first coastal corridor (Figure 1.6). This corridor aligns with the national objectives of expanding the domestic market, supports port-led industrialization (Sagarmala initiative) and the Act East Policy, and inserts domestic companies into the vibrant GVCs of East and Southeast Asia. While India’s trade with East and Southeast Asia has increased at a rapid pace in the past decade, the bulk of this trade is done through the ports on the country’s west coast. This is largely due to lack of efficient transport networks linking the production clusters in northern and central India to ports on the east coast, and insufficient container capacities at the ports to handle the volume of trade flowing to East and Southeast Asia.

ECEC’s main goal is the creation of a competitive environment for the development of trade and industry in the states along the east coast in order to reap the benefits of India’s population dividend through increased production and job creation. ECEC intersects with CBIC and AKIC, and with the recent signing of the Bangladesh, Bhutan, India, and Nepal (BBIN) motor vehicle agreement, it has the potential to develop into a regional land corridor by seamlessly linking to the northeastern states and Southeast Asia.

While basic infrastructure is available in much of ECEC, the main challenges will be to facilitate the establishment and operation of production activities, significantly upgrade trade and transport links between clusters of production and consumption, and raise the value-added of domestic and international supply chains. The presence of a strong

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18 India’s Act East Policy was announced by Prime Minister Modi during the ASEAN–India Summit in 2014. It updated the country’s Look East Policy launched in the 1990s. The Act East Policy defines a new era of economic development, industrialization, and trade ties with ASEAN and other East Asian economies.

19 ADB’s proposed West Bengal North–South Corridor project and South Asia Subregional Economic Cooperation’s Port Connectivity project is exploring an alternative corridor by upgrading 251 km of existing state highways that could substantially improve the hinterland connectivity of the Haldia port in West Bengal with the northern region of the state, the neighboring northeastern states of India, and landlocked Bhutan and Nepal. ECEC will overlap with this proposed West Bengal North–South Corridor project.
Figure 1.6: ECEC—India’s First Coastal Corridor

This map was produced by the cartography unit of the Asian Development Bank. The boundaries, colors, denominations, and any other information shown on this map do not imply, on the part of the Asian Development Bank, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information.

ECEC = East Coast Economic Corridor, GQ = Golden Quadrilateral network, km = kilometer, IT/ITES = Information Technology/Technology Enabled Services, GMS = Greater Mekong Subregion.

Source: Map design derived from study team analysis.
The development of this corridor extends beyond the requirements for improved transport and logistics, and involves reforming the business environment of the states along the corridor and those in the hinterland. The first reform requires facilitation of the interstate movement of goods through harmonization of transport regulation as well as development of logistics hubs for the intermodal exchanges and for the distribution and collection services for the major cities and production clusters.

The second requires improvements in the landside connections to the ports to support the expected concentration of shipments through more efficient terminals. The third involves upgrading access roads and border crossing facilities to minimize the transit time for bilateral trade as well as trade with Southeast Asia. While these involve some level of investment, the primary requirement is for the simplification of processes, harmonization of regulations, and integration of procedures.

Vizag–Chennai Industrial Corridor—Realizing the Vision

This book provides policymakers an overview of ECD in the VCIC along India’s east coast. As mentioned above, VCIC is the first phase of ECEC as well as a part of the Golden Quadrilateral network.20

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20 The fifth longest highway network in the world at 5,846 km, the Golden Quadrilateral highway network connects India’s major cities—Delhi, Mumbai, Kolkata, and Chennai—and its main industrial, agricultural, and cultural centers.
VCIC’s long coastline and strategically located ports provide it with an opportunity to develop multiple international gateways to connect India with GVCs in Southeast and East Asia that form the bedrock of present-day global manufacturing. At the heart of VCIC is a transport corridor that extends north–south over 800 km along the coast, connecting four economic nodes and nine industrial clusters where industries are located.

ECD requires access to land, labor, and other local inputs, and planned urban developments that provide workers with adequate physical and social infrastructure. The development of VCIC to its full potential will require appropriate central, state, and district (local government) policies to attract firms and support growth, and a regulatory regime that makes it easier to set up and run a business, and encourages integrated domestic supply chains and links to global networks and markets.

VCIC will play a critical role in driving India’s Act East Policy and promoting integration with the economies of East and Southeast Asia by connecting India with Asia’s GVCs. VCIC’s long coastline and strategically located ports are critical to unlocking the potential of the Indian economy and should be seen as a source of value-added for domestic production networks and GVCs.21

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21 In addition to National Highway 5, which is part of the Golden Quadrilateral network, VCIC also includes the Kolkata–Chennai rail route and seven noncaptive operational ports. (Kakinada Anchorage Port and Kakinada Deep Water Port are considered a single port.)
The two states comprising VCIC, Andhra Pradesh and Tamil Nadu, have a number of well-established and growing industrial clusters. Some industrial clusters in Tamil Nadu (automobiles, automobile components, and niche electronic components) are already linked with the GVCs of East Asia. To stimulate economic activities in other emerging clusters and distribute growth spatially within the VCIC region, an efficient multimodal and intermodal transport network is necessary, supported by infrastructure services, efficient logistics, and distribution centers. Moreover, nearly 50 million of India’s poor live in the four core states of ECEC: Andhra Pradesh, Odisha, Tamil Nadu, and West Bengal. Pursuing ECD to link lagging regions with industrial clusters will create job opportunities, especially for the poor.

VCIC industries will be geographically concentrated in nine manufacturing clusters in four industrial nodes. An industrial or economic node refers to an agglomeration or collection of existing and planned special economic zones (SEZs) and industrial parks. A node is, simply put, a major stop along the connecting corridor where industrial activities take place. Increasing industrial activity along the corridor requires the development of new managed industrial clusters that complement organic industrial clusters (nodes), as well as the simplification of procedures for setting up a business and the regulations affecting continuing business operations. This also requires improvement in the performance of the supply chains used to deliver both inputs and outputs by ensuring high-quality infrastructure throughout the corridor.
Industry agglomeration can be facilitated by attracting companies in the value chain of other companies already based in the focus states, or particular industries that the corridor provides with geographical advantages, or by building and maintaining advanced infrastructure to support industries. Industries operating within the corridor will benefit from access to industrial production units, decreased transportation and logistics costs, improved delivery time, and a reduction in inventory costs. These industries include those with an established presence in VCIC (e.g., textiles and apparel), “sunrise” industries that have limited or no presence in VCIC but are willing to expand or relocate (e.g., electronics), and new industries that can be attracted to set up operations in VCIC. To stimulate both domestic investment and FDI, regulatory reforms and institutional changes are needed to facilitate business start-up procedures and business operations, the seamless movement of goods and services within and beyond the corridor, more synchronized industrial and urban planning in and around industrial clusters and zones.

Proposing Node-Based Industrial Development

In the initial phase, the focus is on brownfield locations to tap into existing economies of agglomeration or intervene to remove the binding constraints in brownfield locations that are not functioning efficiently in order to unlock their potential in the near-term. The intent is not to seek to develop mega industrial zones located over contiguous land. Instead, the approach is to look at optimal size locations that can be linked through an efficient transport network to the next phase, which looks at developing greenfield locations.

The VCIC nodes will encompass an urban center (proximity to a city <50 km), will be in close proximity to raw materials (<25 km for certain industries like food processing), and will be linked to a port (proximity to a port <50 km). This approach is designed to facilitate sustainable industrial growth synergies between an urban center, a production enclave, and a port, ultimately leading to a dynamic growth center. In order to reap the full benefits of node-based development, an institutional and policy framework that facilitates doing business is needed.

Node locations were selected based on factors such as demand from industries, the government’s vision
for the region, and state development plans for each of these areas. The selection was based on current level of industrial agglomeration; availability of land for development of new industrial clusters; proximity to urban centers and seaports, rail, and road connectivity; and availability of power and water.

After several rounds of analyses, four industrial nodes were selected, namely: Vizag, Kakinada, Gannavaram–Kankipadu, and Srikalahasti–Yerpedu.

The Government of Andhra Pradesh owns large swaths of land near the proposed nodes, allowing developers to sidestep the contentious and protracted process of enforced land acquisition. To acquire needed land that is not owned by Andhra Pradesh, the state government announced a land-pooling model in January 2015, though it has yet to pass the accompanying regulations.

The northernmost node, Vizag, is in close proximity to the Vizag and Gangavaram ports, and the industrial activities in the immediate hinterland of these ports. The southern node, Srikalahasti–Yerpedu, is close to the urban centers of Tirupati and Nellore, the port cluster from north of Chennai to Krishnapatnam, and the industrial zones in their immediate hinterland, most notably Sri City. The two nodes in the central region, Gannavaram–Kankipadu and Kakinada, are primarily greenfield, with Vijaywada as the major urban cluster. Gannavaram–Kankipadu serves the surrounding industrial clusters and will be served in the future by the port of Machilipatnam. The Kakinada node, is positioned around the Kakinada port and the urban centers of Kakinada and Rahjamundry (Figure 1.7).
Constructing Industrial Clusters

The node-based development of VCIC into an integrated market begins with strengthening the corridor’s industrial clusters. The current trunk roads and rail network are sufficient to support this development; however, capacity will have to be increased as economic activity expands. More importantly, the linkages between cluster components need to be
strengthened to allow reliable delivery of goods and services. In addition, the gateway seaports need to improve their container handling facilities, as the flow of goods through ports needs to become more efficient and better integrated.

Industrial activities in the production enclaves also need to be increased. This may involve the expansion of industrial zones, simplification of regulations related to doing business, and improvements in supporting services provided by the management of these zones. The challenge is to consolidate the fragmented governance mandates of the various authorities under one zonal or cluster management entity that allows businesses to operate seamlessly and efficiently. The goal is to provide for flexibility in engaging government and private entities to perform specific roles in the planning, development, and management of zones and clusters through the delegation of powers or contractual arrangements as needed (Figure 1.8). The Government of Andhra Pradesh’s Industrial Area Local Authority and the amendments providing local authority status to the Andhra Pradesh Industrial Investment Corporation offer a framework that can be further improved upon.

**Figure 1.8 Role of Cluster Management**

- **Goals**
  - Increase economic activity within cluster
  - Strengthen supply chains to regional suppliers and markets
  - Expand participation in international trade

- **Responsibilities**
  - Plan, construct, and maintain transport infrastructure
  - Develop sites for production enclaves; facilitate establishment of firms
  - Integrate international gateway in domestic supply chains
  - Support specialization and backward linkages
  - Improve supporting services provided by urban center

- **Components**
  - Production Enclaves
  - International Gateways
  - Urban Center

Source: Study team analysis
Urbanization alongside Industrial Development

Industrialization and urbanization have generally proceeded together in developing economies. However, in India, industries have been moving away from core cities since the 1980s for the following reasons: state governments offer incentives for new industries to locate in less developed areas, polluting industries are forced to relocate outside cities, increasing land prices have made it more difficult to consolidate in urban areas, and city governments have not considered local economic development as their mandate and do not actively promote industrialization. In many Indian cities where industries moved out but the workforce stayed, the workforce eventually shifted to informal services sector opportunities.

Many new industrial locations do not have planned urban developments or even adequate housing, and haphazard development has mushroomed around these locations as a result. India thus faces a dual dilemma: urban areas with insufficient industry to provide enough jobs for the local population, and industrial areas lacking adequate urbanized areas for supply of skilled workers and serving as centers of innovation.

A proximate urban center is needed to support production activities by providing housing, education, and other services for the workforce. An urban center additionally supports the delivery of goods produced through the development of urban freight distribution networks. One of

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the challenges of industrialization is addressing quality-of-life issues for workers attracted to newly-created manufacturing jobs in new and existing urban settings. ECD offers an opportunity to synchronize the processes of urbanization and industrial development following decades of disconnect between the two. An emerging model of harmonized industrial and urban development in Andhra Pradesh is the private-sector-led Sri City (Box 1.2).

Box 1.2

Sri City—A Model of Industrial-Urban Development

Sri City is based on an integrated model that includes industrial, commercial, and residential development along with the infrastructure needed for each type of land use. Much of the proposed development is already completed and includes high-quality infrastructure to support a wide range of industries (roads, power, telecommunications, water, sewerage, and other utilities); logistics; residential development (workforce housing, apartments, and high-end villas); commercial development (offices, shopping, and hotels); recreational centers (parks, gardens, and golf courses); social infrastructure (schools, higher education, health centers, and hospitals); and facilities for safety and security.

OnePlus, a phone handset company, is partnering with contract manufacturer Foxconn to commence local assembly operations in India, which is one of the world’s fastest growing smartphone markets. The first batch of smartphones produced from Foxconn’s Sri City facility in Andhra Pradesh were commercially available by end of 2015. PepsiCo also opened one of its largest global facilities, and its largest beverages plant in India, in Sri City. The facility produces a range of beverages including fruit juices and carbonated soft drinks, and is expected to expand to sports beverages and food items.

Sri City is an example of a world-class urban development attracting foreign investment in manufacturing. In order for the Sri City model to be widely adopted in the Vizag–Chennai Industrial Corridor, a comprehensive governance framework that supports the management and planning of the corridor’s zones and clusters is needed.


23 According to the International Labour Organization, “decent work sums up the aspirations of people in their working lives. It involves opportunities for work that is productive and delivers a fair income, security in the workplace and social protection for families, better prospects for personal development and social integration, freedom for people to express their concerns, organize and participate in the decisions that affect their lives and equality of opportunity and treatment for all women and men.” International Labour Organization. 2016. Decent Work. http://www.ilo.org/global/topics/decent-work/lang--en/index.htm
Supporting Coastal Economic Zones and Special Economic Zones through Economic Corridor Development

India has unveiled plans to emulate the East Asian experience of developing coastal economic zones and reform its existing SEZs to boost exports and employment, and integrate with the GVCs. SEZs are industrial enclaves within a country that enjoy economic and regulatory privileges and concessions not generally available to the rest of the country.

India was the first Asian economy to set up an export processing zone in Kandla in 1965 and some 4 decades later it laid out a regulatory framework to set up SEZs. However, the SEZ Act, 2005 has failed to achieve its main goals of boosting output, exports, employment, and FDI; and developing infrastructure. The reasons for this failure include the preferential treatment given to ICT industries at the expense of other industries; a disconnect with the export policies later being advanced under the Foreign Trade Policy, 2009; a lack of supporting infrastructure, particularly transport, in the vicinity of SEZs; and the failure to address the complicated issues surrounding land acquisition. Even within SEZs that have the necessary infrastructure, ultimate failure could stem from problems in planning, coordination, and land acquisition. Most policymakers are now aware that overcoming these obstacles requires foresight, simultaneity of implementation across a geographically delimited area, and regulatory consistency over time.

SEZs can benefit from economic corridors through high-quality infrastructure; access to sources of industrial production; reduced ICT, inventory, and transportation costs; and improved delivery time. Box 1.3 discusses noteworthy cases of SEZ development in the PRC.

Apart from connectivity, a well-functioning institutional and regulatory framework is also essential for the success of a SEZ. The establishment of an economic corridor can provide the impetus to enact the policy reforms needed to drive investment and improve the ease of doing business. Furthermore, enhanced trade and transport links centered on SEZ development within an economic corridor can facilitate integrated regional trade and development, and generate a wider range of economic benefits including a substantial increase in international trade.

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Successful SEZs in the People’s Republic of China

The People’s Republic of China (PRC) has utilized special economic zones (SEZs) as an instrument to gradually liberalize trade and develop domestic goods and services value chains. Excluding export processing zones and industrial parks, SEZs in the PRC accounted for about half of all foreign direct investment, 44% of exports, and 6% of employment in 2012. SEZs are also credited with technology spillovers, national productivity increases, industrial clustering, and structural transformation.

The PRC followed a model in which the SEZ policy is incorporated into national development planning. The PRC also pursued a locational strategy for its four original SEZs in Shantou, Shenzhen, Xiamen, and Zhuhai. In the case of Shenzhen and Zhuhai, border orientation was the main factor in their locational choice as the SEZs share a border with Hong Kong, China, which has become a major manufacturing and financial center, and Macau, China, which has developed an economy based on tourism, mainly gambling. These SEZs are located in the southern coastal provinces of Guangdong and Fujian. The government also promoted a strategy of allowing the two provinces to undertake special policies and flexible measures to promote foreign trade and investment.

Linkage effects emanating from the Shenzhen SEZ lately appear to be the strongest. The Shanghai Songjiang Export Processing Zone (EPZ)—an information and communications technology-based EPZ in Shanghai—accounted for one-third of all exports in 2014 from the 50 EPZs in the country. The zone, located 35 kilometers from the city center, is connected to the city’s major airports (Hongqiao and Pudong), a major port (Wusong), and a highway and railway (Shanghai’s Hangzhou Highway and Railway).

Organization of the Book

This book provides policymakers in India and other developing countries an overview of the application of ECD principles in an industrial corridor along India’s east coast. The development of VCIC aligns with the Government of India’s Make in India and Sagarmala initiatives, which rely upon ECD and port-led industrialization as policy instruments to boost manufacturing and overall economic growth. While previous government-led efforts have yielded mixed results, the effective harnessing of public and private sector resources in the VCIC region has the potential to energize the country’s manufacturing sector and provide employment to millions of new entrants into the workforce.

The development of a well-planned and efficient industrial base served by world-class connectivity infrastructure will strengthen domestic supply chains and help link them with GVCs. Furthermore, attracting more private companies, particularly second- and third-tier manufacturing companies, will improve the global competitiveness of local manufacturers, thus promoting regional development. Finally, by investing in improved connectivity between the corridor and underdeveloped regions, VCIC will promote inclusive growth in the adjacent hinterlands.

Chapter 2 of this book describes the importance of unifying domestic markets and drives home the need for India to fully participate in the world’s most dynamic value chains centered in East Asia; the chapter highlights the impacts that policy reforms and investments in infrastructure and skills development can have on increasing the competitiveness of its manufacturing sector and its participation in GVCs. Chapter 3 discusses aspects of India’s regulatory environment that constrain growth and how these factors can be addressed, as well as the issues of land management and urbanization. Chapter 4 proposes a node-based development approach for VCIC that builds upon existing manufacturing clusters in the corridor region. Chapter 5 discusses the importance of developing world-class infrastructure in VCIC to support domestic supply chains and provide links to GVCs. Chapter 6 concludes and presents the future direction for VCIC.
Unlocking the Potential of Vizag–Chennai Industrial Corridor Industries

“The quest for Big Ideas may have failed because development economists are looking at 21st century industrialisation using 20th century perceptions of trade and industry... In a nutshell, the missing element boils down to supply chains.”

—Richard Baldwin
In Trade and Industrialisation After Globalisation’s 2nd Unbundling: How Building and Joining a Supply Chain are Different and Why it Matters

Realizing Manufacturing Strength

India’s manufacturing sector possesses enormous potential amid ever-increasing global interconnectivity in merchandise trade, investments, and services. Indian manufacturers should seize this golden opportunity to emerge from the shadow of the country’s services sector and capture more of the global market.

India’s product makers have long performed below their potential. The manufacturing sector remains underdeveloped, as evidenced by its relatively small contribution to gross domestic product (GDP) in comparison to its Asian peers. While India’s share in total world trade remains very low, this should motivate the country to improve its share by increasing its participation in global value chains (GVCs). As a vibrant economic corridor, Vizag–Chennai Industrial Corridor (VCIC) holds the promise of becoming one of the key drivers of economic growth in India.

To turn India’s manufacturing dream into reality, VCIC should cater to industries in which it commands a comparative advantage. The corridor’s industrial development strategy should focus on achieving a structural shift that involves transitioning micro-, small, and medium-sized enterprises (MSMEs) into large or even mega enterprises. Realizing this objective will require India’s manufacturers to improve their labor and capital productivity dramatically as VCIC will need contributions from both capital- and labor-intensive manufacturing industries, including modern, high-tech industries.

Indian manufacturers lag behind their global peers in production planning, supply chain management, quality, and maintenance. Consequently, workers in India’s manufacturing sector are less productive than their counterparts
elsewhere in Asia. To boost productivity and fully harness VCIC’s potential, a number of structural and policy constraints—at both the state and central levels—need to be tackled simultaneously. The country’s central and state governments can start by dismantling existing barriers in markets for land, labor, and infrastructure.

**Tapping into Global Value Chains**

Economic activities in the 21st century—trade, investment, services, and intellectual property—are interconnected on a global scale. Investments flow not only into production facilities, but also increasingly into training, technology, and long-term business development. The expansion of manufacturing activities, enhanced trade in manufactured goods, and improvements in the provision of complementary services—including telecommunications, internet services, air cargo, trade-related finance, and customs clearance—will be an important force in powering future growth.25

The cross-border exchanges of parts and components, rather than final goods, have accounted for an increasing share of global trade for decades. Network products comprised nearly 70% of the total increment in manufacturing exports from East Asia from 1991 to 2011; however, the comparable figure for India was only 22%.26 Over the last few years, global trade has slowed as trade liberalization momentum faded and

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26 Footnote 25.
GVCs in several regions matured.\textsuperscript{27} India’s share in total world trade (2.1\% in 2013) is still very low, which provides impetus for the country to increase its share and improve its participation in GVCs.\textsuperscript{28}

India’s manufacturing sector remains underdeveloped, as evidenced by its relatively small contribution to GDP (17\%) in comparison to its peers (Figure 2.1). There is enormous potential within this sector, and with it an opportunity to tap into GVCs and expand industrial output, employment, and productivity simultaneously. As a vibrant economic corridor, VCIC holds the promise of becoming one of the key drivers of economic growth in India, particularly in the southern part of the country.

\textbf{Figure 2.1: Share of Manufacturing to Total GDP in 2014 (\%)}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure2.1.png}
\end{figure}

\begin{itemize}
\item \textbf{Thailand} 33
\item \textbf{Republic of Korea} 31
\item \textbf{People’s Republic of China} 31
\item \textbf{Malaysia} 24
\item \textbf{Gujarat} 24
\item \textbf{Hungary} 23
\item \textbf{Germany} 23
\item \textbf{Indonesia} 22
\item \textbf{Poland} 19
\item \textbf{Japan} 19
\item \textbf{India} 17
\item \textbf{Maharashtra} 17
\item \textbf{Tamil Nadu} 15
\item \textbf{Argentina} 15
\item \textbf{Andhra Pradesh} 9
\end{itemize}

GDP = gross domestic product.


\textsuperscript{27} ADB. 2015. \textit{Asian Economic Integration Report Special Chapter: Can Special Economic Zones Drive Economic Development?} Manila.

\textsuperscript{28} In April 2015, the Foreign Trade Policy, 2015–2020 was unveiled with an aim to double exports to $900 billion by 2019–2020. The policy includes trade facilitation and improving the ease of doing business in line with the Make in India initiative.
“Slicing” the Production Process

An array of terms has been used to describe GVCs, including international production fragmentation, global production network, vertical specialization, slicing the value chain, and outsourcing. GVCs open up opportunities for countries to specialize in different slices (tasks) of the production process depending on their relative cost advantage and other economic fundamentals. Consequently, parts and components are now exchanged across borders at a faster rate than final goods.

By focusing on the sequencing of tangible and intangible value-added activities—from conception and production to end use—GVC analysis provides a bird’s-eye view of global industries from the top-down (e.g., examining how lead firms govern their global affiliates and supplier networks) and from the bottom-up (e.g., examining how business decisions affect the trajectory of economic and social upgrading or downgrading in specific countries and regions). The global manufacturing trade is no longer simply an exchange of final products, but increasingly an exchange of parts and components that comprise them.

Participation in GVCs by Apple is one example of how slicing the production process has helped a multinational company reduce costs in the manufacture of one of its premium products, the iPhone. Apple, the world’s second largest technology company by revenue has outsourced all of its manufacturing outside the United States by leveraging its global supply chain (Box 2.1).

While Apple is a case in point of how a multinational has leveraged GVCs to reduce costs, the development of Thailand’s automobile industry in East Asia is a case of how a country linked itself to regional markets in East and Southeast Asia. The Government of Thailand has taken a proactive stance in promoting investor-friendly policies to attract large automobile giants, and groomed domestic small and medium-sized auto component manufacturers through technical trainings (Box 2.2).

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29 The national definition of small and medium-sized enterprises in Thailand excludes microenterprises. Other countries in the region such as India and Malaysia include microenterprises in their national definition.
Apple is particularly adept at using global value chains to its advantage. It sources suppliers that can manufacture parts for its products cost-effectively and still meet the company’s stringent quality requirements. Figure B.2.1 below shows the different countries and suppliers involved in the production of one of Apple’s signature products, the iPhone. Apple manages the product design process at its headquarters in the United States (US) and sends orders for different parts to suppliers around the globe. For example, Samsung makes the memory and applications processor in the Republic of Korea, while Murata manufactures the Bluetooth and WiFi components in Japan. All of the iPhone’s components are sent to Foxconn in Shenzhen in the People’s Republic of China for final assembly. Facilities in the US manage warehousing and distribution across the country and to other parts of the world.

Its global supply chain has helped Apple generate cost savings in the manufacture of the iPhone. In addition, Apple reduces its taxable profits by locating segments of the manufacturing process outside of the US.

**Figure B.2.1: The iPhone Supply Chain**

Sources: Study team analysis; The Gateway Online. (n.d.). The iPhone Supply Chain. Quoted in P. Tran. 2014. The Global iPhone Supply Chain. Social Times. 27 January.
The success of Thailand’s automobile industry in global value chain participation is mainly attributed to investor-friendly policies and regulations. Enabling measures and streamlined regulations—such as allowing foreign firms to hold 100% equity in the country’s industrial zones, implementing income tax exemptions, and lowering duty rates on capital goods imports—paved the way for large global players like BMW, Ford, and General Motors to set up manufacturing plants in Thailand. The government also facilitated single window clearance for major global automobile firms via dedicated investment centers.

Initially, there were many Tier 1 component suppliers available to the major automobile companies that had set up operations in Thailand, but only few domestic Tier 2 and 3 suppliers. In response, the government provided technical assistance and training for the auto parts industry and established a special purpose agency to help forge links between local parts suppliers and large assemblers, especially multinational corporations in Thailand and abroad, and set up a database of potential suppliers for global manufacturers. Domestic small and medium-sized enterprises were able to strengthen relations with the major automobile companies and their Tier 1 suppliers, while the multinationals forged partnerships with small and medium-sized enterprises to help them scale up operations by providing a ready market, sharing technology and production-related knowledge, and facilitating the availability of finance. At present, Thailand’s automobile industry is serving the domestic market and regional markets in East and Southeast Asia.

**Figure B.2.2: Composition of the Automobile Industry in Thailand**

<table>
<thead>
<tr>
<th>ASSEMBLER (companies)</th>
<th>TIER 1</th>
<th>TIER 2/3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR 18</td>
<td>MOTORCYCLE 7</td>
<td>462 COMPANIES</td>
</tr>
<tr>
<td>Pure Thai</td>
<td>11%</td>
<td>Pure Thai</td>
</tr>
<tr>
<td>Foreign Majority</td>
<td>44.5%</td>
<td>Thai Majority</td>
</tr>
<tr>
<td>Pure Foreign</td>
<td>44.5%</td>
<td>Joint Venture</td>
</tr>
<tr>
<td>Thai Majority</td>
<td>16%</td>
<td>Foreign Majority</td>
</tr>
<tr>
<td>Foreign Majority</td>
<td>27%</td>
<td>Pure Foreign</td>
</tr>
<tr>
<td>Pure Foreign</td>
<td>27%</td>
<td>Pure Foreign</td>
</tr>
</tbody>
</table>

\(^a\) Definition of Tier 1/2/3 component suppliers is as follows: Tier 1 suppliers: firms that sell finished components (e.g., seats, dashboards, electronic modules, brake-axle-suspension, etc.) directly to the vehicle manufacturers. Tier 2 suppliers: firms supplying products/services (e.g., carbon brush, window glasses, etc.) directly to Tier 1 suppliers. Tier 3 suppliers: firms supplying raw materials/basic engineering products (e.g., plastic compound, synthetic rubber, steel) used in production of components to Tier 2 suppliers.

A number of policy constraints—at both the state and central levels—need to be tackled to drive VCIC’s industrial development, and strengthen domestic supply chains and linkages with GVCs.

Identifying Constraints to Industrial Growth in India

With the partial exception of automobiles and auto components—and more recently sound-recording equipment—the missed opportunity to grow Indian manufacturing, develop domestic supply chains, and tap into GVCs reflects the following constraints:

- focus on the large domestic market over exports;
- concentration on low value-added goods, which leads to low value-added exports;
- suboptimal scales of production in many sectors; and
- lack of quality inputs due to lagging research and development, technology, and skills development; and weaknesses in trade facilitation and logistics–related infrastructure.

These constraints are often the result of certain aspects of policy—at both the state and central levels—and need to be tackled to promote VCIC’s industrial development, strengthen domestic supply chains, and
Unlocking the Potential of Vizag–Chennai Industrial Corridor Industries

Link with GVCs. This will require addressing a regulatory environment that makes it difficult for firms to enter and exit markets, and trade with firms in other countries; making sufficient investments in infrastructure; providing access to land and financing for both large firms and MSMEs; and ensuring that workforce skills meet the needs of expanding industries.

Moving Toward a Business-Induced Future

No single industry will drive the development of VCIC. To help realize the untapped potential of the Indian economy, VCIC will need contributions from both capital- and labor-intensive manufacturing industries, including modern and high-tech industries such as pharmaceuticals, low-tech industries such as textiles and apparel, and everything in between. This transformation will also require many types of firms, including large firms, both foreign and domestic, playing an anchoring role, as well as MSMEs engaging with one another and with larger firms to strengthen domestic supply chains and link with GVCs.

Based on an analysis of 78 industries, grouped into 25 sectors, two growth scenarios for India have been identified:

**Business as Usual (BAU):** Growth was forecast by correlating manufacturing growth in Andhra Pradesh with India’s projected GDP growth.\(^{30}\)

**Business-Induced Scenario (BIS):** Growth in seven illustrative industries was assumed to expand at rates pursued by stakeholders.\(^{31}\)


\(^{31}\) The BAU scenario is based on the correlation of the VCIC’s GDP with India’s GDP; hence, sector growth is agnostic. For the BIS scenario, the sector growth rates assumed for estimating corridor manufacturing GDP in 2034–2035 are as follows: food processing 10.0%, textiles 10.0%, metallurgy 7.0%, pharmaceuticals 15.5%, automobiles 11.0%, and chemicals and petrochemicals 10.0%. This scenario does not take into account the benefits of the VCIC.
A parametric analysis was undertaken to shortlist 7 of the 25 sectors. The parametric assessment comprised “what is” analysis to identify current sectors of strength for the corridor and “what could be” analysis to identify sectors that show promise for the future. The “what is” analysis was done with a view to shortlist sectors with a strong demand-pull and showcase the presence of factors of production along the proposed corridor. The parameters were evaluated through standard proxies such as trends in foreign direct investment (FDI), Industrial Entrepreneurs Memorandum, exports, output, and future investments, among others. The list of industries was further ratified using a “what could be” analysis to identify sectors that, while not currently areas of strength for India or the proposed corridor region, might hold the potential to emerge as winners in the long-term. The parameters of the “what could be” analysis focused on multiple aspects, which are detailed below.

**India’s comparative disadvantage in trade.** This was measured quantitatively using revealed comparative analysis to show that sectors like electronics, electrical machinery, and machinery have a huge dependency on imports. The relative disadvantage in a particular sector could be due to many reasons like relative high domestic costs of production or high costs to reach markets due to poor infrastructure.

**Sectors gaining in global importance.** This analysis was undertaken using global trade data. The growth in global trade was calculated for all 25 sectors from 2001 to 2011; sectors with more than 10% growth were considered. The share in global exports was also considered and sectors with a substantial share in global exports were shortlisted.

**Sectors with high domestic demand being met through imports and sectors of interest to the state government.** This aspect had both a quantitative and qualitative approach. On the quantitative side, the top import sectors and the growth rate at which imports were growing were analyzed. The qualitative approach involved picking those sectors in which the state government wants to focus on over the next 5–10 years. This was based on discussions with Government of Andhra Pradesh officials.

The potential evolution of the seven sectors is especially relevant to the outcomes presented under the two scenarios. However, this exercise is not about picking industry winners, rather it is about recognizing that different industries require different inputs. If some of these are underprovided by the market, policy makers have to figure out why
and develop a solution. It is thus important for the government to work toward uncovering the most significant obstacles to these industries and determining what interventions are most likely to remove them.

Over a 20-year period starting in fiscal year (FY) 2015–2016, total output under the BAU scenario is expected to increase from Rs1,110 billion to around Rs3,000 billion. Realizing the full potential of VCIC under the BIS would lead to total output of more than Rs7,823 billion over the same period (Figure 2.2). The key sectors contributing around two-thirds of VCIC’s output in FY 2035–2036 under the BIS are food processing, chemicals and petrochemicals, textiles and apparel, and electronics. Manufacturing gross value added is seen climbing from Rs168 billion in FY 2015–2016 to Rs645 billion in FY 2035–2036 under the BAU scenario, and to Rs1,275 billion under the BIS.

In terms of employment generation, the number of jobs in the seven sectors is projected to increase from 2.9 million in FY 2015–2016 to between 5.8 million (BAU) and 11.8 million (BIS) in FY 2035–2036. Based on current trends in

Figure 2.2: Projected Manufacturing Output—BAU and BIS (Rs billion)

Key sectors identified are food processing, chemicals and petrochemicals, textiles and apparel, and electronics.

= BAU (Business as usual),  = BIS (Business-induced scenario).

BAU = Business-as-Usual, BIS = Business-Induced Scenario, FY = fiscal year.

wages and employment, the food processing, metallurgy, and textiles and apparel sectors have the most potential to generate new jobs over the next 2 decades, while the automobiles, electronics, and pharmaceuticals sectors are expected to see more modest job growth and more significant wage gains.

Identifying Prospective Industries

As part of the BAU-BIS exercise, the study team identified a representative grouping of potential growth drivers that included industries with an established presence in VCIC (e.g., textiles and apparel); “sunrise” industries, or those with limited or no presence but a willingness to expand or relocate (e.g., electronics); and new industries that could be attracted to set up operations in VCIC. The team also took into account the likelihood of an industry thriving in a corridor environment based on its ability to attain high growth rates driven by domestic and/or export demand, competitive and comparative advantages at both the state and national levels, and potential to create employment opportunities and drive wages higher.32

Table 2.1 presents the findings of the parametric analysis for these illustrative industries. The analysis does not seek to promote any one industry over another, given that competitive advantages may shift over time. Rather, it provides useful information on the key characteristics attractive to investors, crucial success factors, and the existing industrial agglomerations corresponding to each of the seven industries.

## TABLE 2.1 KEY FACTS FROM THE PARAMETRIC ANALYSIS

### AUTOS AND AUTO COMPONENTS

**CHARACTERISTICS ATTRACTIVE TO INVESTORS**
- Major contributor to India’s exports
- High mergers and acquisition (M&A) activity in India, showcasing high investor interest
- High potential to generate employment with higher wages

### CHEMICALS AND PETROCHEMICALS

**CHARACTERISTICS ATTRACTIVE TO INVESTORS**
- India’s imports in the chemicals and petrochemicals sector account for about 50% of its total imports
- Domestic market is expected to grow more than 10% per year in the medium-term
- High level of imports to India and high domestic demand envisaged for the sector

### CRITICAL SUCCESS FACTORS
- Proximity between overseas export markets and suppliers
- Proximity to seaport
- Logistics connectivity (rail and road)
- Power availability
- Skilled labor
- Existing industrial agglomeration

### EXISTING INDUSTRIAL AGGLOMERATION
- Chittoor and Krishna

### CRITICAL SUCCESS FACTORS (continued)
- High M&A activity in the sector, showcasing high investor interest
- Petroleum, Chemicals, and Petrochemicals Investment Regions in Andhra Pradesh will lead to the right factors of production
- High employment potential

### EXISTING INDUSTRIAL AGGLOMERATION (continued)
- Kakinada, Machilipatnam, and Vizag

*continued on next page*
 Scaling New Heights: Vizag-Chennai Industrial Corridor, India’s First Coastal Corridor

Table 2.1 continued

<table>
<thead>
<tr>
<th>ELECTRONICS</th>
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<tbody>
<tr>
<td><strong>CHARACTERISTICS ATTRACTIVE TO INVESTORS</strong></td>
</tr>
<tr>
<td>• High domestic demand envisaged, with high potential for import substitution</td>
</tr>
<tr>
<td>• India’s electronics market is expected to grow more than 20% per year across most subsegments</td>
</tr>
<tr>
<td>• Potential sunrise industry for India</td>
</tr>
<tr>
<td>• High employment potential with higher wages</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>FOOD PROCESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHARACTERISTICS ATTRACTIVE TO INVESTORS</strong></td>
</tr>
<tr>
<td>• Major contributor to Indian exports</td>
</tr>
<tr>
<td>• Doubled its share among total Indian exports from 2001 to 2013</td>
</tr>
<tr>
<td>• High M&amp;A activity in India, showcasing high investor interest</td>
</tr>
<tr>
<td>• VCIC districts are rich in food resources and have necessary factors of production to attract investors</td>
</tr>
<tr>
<td>• High employment potential</td>
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<table>
<thead>
<tr>
<th>CRITICAL SUCCESS FACTORS</th>
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</thead>
<tbody>
<tr>
<td>• Sea port airport accessibility</td>
</tr>
<tr>
<td>• Airport accessibility</td>
</tr>
<tr>
<td>• Uninterrupted power supply</td>
</tr>
<tr>
<td>• Availability of skilled human resources and institutions for skills development in proximity</td>
</tr>
<tr>
<td>• Water supply and availability of pure water or ultra-pure water</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXISTING INDUSTRIAL AGGLOMERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Chittoor, Krishna, and Vizag</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CRITICAL SUCCESS FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Proximity to raw materials</td>
</tr>
<tr>
<td>• Presence of hatcheries and farms</td>
</tr>
<tr>
<td>• Port proximity</td>
</tr>
<tr>
<td>• Adequate port infrastructure</td>
</tr>
<tr>
<td>• Cold chain</td>
</tr>
<tr>
<td>• Effective transport link</td>
</tr>
<tr>
<td>• Away from polluting industries</td>
</tr>
<tr>
<td>• Power availability</td>
</tr>
<tr>
<td>• Water supply</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXISTING INDUSTRIAL AGGLOMERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Chittoor, Godavari, Kakinada, Krishna, and Nellore</td>
</tr>
</tbody>
</table>

continued on next page
Unlocking the Potential of Vizag–Chennai Industrial Corridor Industries

Table 2.1 continued

### METALLURGY

**CHARACTERISTICS ATTRACTIVE TO INVESTORS**
- Major contributor to India’s exports
- M&A activity in India, showcasing high investor interest
- VCIC districts rich in natural mineral resources
- High employment potential

**CRITICAL SUCCESS FACTORS**
- Access to raw materials
- Excellent connectivity (road and rail)
- Power availability and tariff

**EXISTING INDUSTRIAL AGGLOMERATION**
- Chittoor

### PHARMACEUTICALS

**CHARACTERISTICS ATTRACTIVE TO INVESTORS**
- Major contributor to India’s exports
- Revealed comparative advantage of 1.3 in global pharmaceutical exports (strong)
- High domestic demand envisaged
- M&A activity in India, showcasing high investor interest
- High potential to generate employment with higher wages
- Knowledge-based sector

**CRITICAL SUCCESS FACTORS**
- Availability of highly skilled labor
- Excellent connectivity (road and rail) required for distribution logistics
- Proximity to seaport
- Access to high quality raw materials
- Proximity to city infrastructure for easy access to high quality skilled workforce
- Water availability

**EXISTING INDUSTRIAL AGGLOMERATION**
- Vizag

*continued on next page*
TEXTILES AND APPAREL

CHARACTERISTICS ATTRACTIVE TO INVESTORS

- Major contributor to India’s exports
- India has a revealed comparative advantage of 2.8 in global textile exports (very strong).
- M&A activity in India, showcasing high investor interest
- VCIC districts provide necessary factors of production for attracting investments
- High employment potential

CRITICAL SUCCESS FACTORS

- Availability of continuous power supply
- Availability of skilled human resources
- Access to raw materials
- Excellent connectivity (road and rail) required for distribution logistics

EXISTING INDUSTRIAL AGGLOMERATION

- Vizag

VCIC = Vizag–Chennai Industrial Corridor.
Source: Study team analysis.

In Andhra Pradesh, the industries with a state-level revealed comparative advantage (RCA)—in terms of gross value added—include food processing, electrical machinery, and pharmaceuticals (Table 2.2). These industries are also doing well at the national level, according to the study team’s “what is” analysis. On the other hand, the performances in Andhra Pradesh of industries such as auto and auto components, chemicals and petrochemicals, and textiles and apparel have been lackluster in comparison with other states. Furthermore, RCA analysis of the electronics and chemicals and petrochemicals sectors at the national level showcases the huge dependency of India on imports, which presents an opportunity for domestic manufacturing to meet domestic demand.

State-level RCA was calculated on the basis of gross value-added (GVA) from each of the competing states (Andhra Pradesh, Maharashtra, Tamil Nadu, and Karnataka). The relative index for each sector was obtained using the formula: RCA (sector, state) = [GVA (sector, state)] / [GVA (all sectors, state)] / [GVA (sector, India)] / [GVA (all sectors, India)]. This was used to identify sectors where corridor states are doing better in terms of value-added.
Table 2.2: Revealed Comparative Advantage Analysis of States by Sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>AP and TN</th>
<th>AP</th>
<th>GJ</th>
<th>KA</th>
<th>MH</th>
<th>TN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food processing</td>
<td>1.12</td>
<td>1.41</td>
<td>0.78</td>
<td>1.03</td>
<td>0.81</td>
<td>0.83</td>
</tr>
<tr>
<td>Auto and auto components</td>
<td>1.28</td>
<td>0.16</td>
<td>0.62</td>
<td>0.75</td>
<td>0.84</td>
<td>2.40</td>
</tr>
<tr>
<td>Chemicals and petrochemicals</td>
<td>0.37</td>
<td>0.42</td>
<td>1.71</td>
<td>1.26</td>
<td>1.69</td>
<td>0.32</td>
</tr>
<tr>
<td>Metallurgical industries</td>
<td>0.81</td>
<td>0.77</td>
<td>0.72</td>
<td>0.83</td>
<td>0.78</td>
<td>0.84</td>
</tr>
<tr>
<td>Machinery</td>
<td>1.02</td>
<td>0.43</td>
<td>1.05</td>
<td>1.15</td>
<td>1.18</td>
<td>1.60</td>
</tr>
<tr>
<td>Electronics</td>
<td>0.98</td>
<td>0.77</td>
<td>0.78</td>
<td>1.19</td>
<td>0.90</td>
<td>1.19</td>
</tr>
<tr>
<td>Electrical machinery</td>
<td>0.96</td>
<td>1.19</td>
<td>0.93</td>
<td>1.22</td>
<td>1.10</td>
<td>0.74</td>
</tr>
<tr>
<td>Textiles and apparel</td>
<td>1.42</td>
<td>0.56</td>
<td>0.86</td>
<td>0.86</td>
<td>0.79</td>
<td>2.27</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>1.22</td>
<td>2.18</td>
<td>0.78</td>
<td>0.82</td>
<td>0.75</td>
<td>0.25</td>
</tr>
</tbody>
</table>

AP = Andhra Pradesh, GJ = Gujarat, KA = Karnataka, MH = Maharashtra, and TN = Tamil Nadu.

Dissecting Policy Constraints to Poor Industrial Performance

The poor performance of India’s manufacturing sector as a whole points to a long list of constraints that inhibit growth. Inadequate public sector inputs in infrastructure—including electricity, roads, and ports, among others—broadly affect all industries in a given region. Connecting VCIC industries to GVCs requires world-class infrastructure, logistics, and distribution facilities; and reliable power supplies. Increasing VCIC’s power generation capacities and strengthening transmission are a priority. Strengthening VCIC’s road and rail spines, and developing cross-connecting lateral links, will further enhance logistics competitiveness.

While the inadequacy of infrastructure affects all industries in a similar manner, policy constraints in terms of over-regulation and market failures may affect each industry differently.

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Policy constraints in terms of over-regulation and market failures may affect each industry differently.
Recognizing the Costs of Over-Regulation and Market Failure

Overregulation imposes enormous hidden costs on the economy. Inhibiting regulatory factors in India include the following:

- industry regulations that govern entry and exit into the market;
- land-related regulations that restrict the availability and/or increase the cost of land for industrial purposes;
- the policy, until the mid-2000s, of “reserving” entire product lines, especially labor-intensive ones, for firms with plant and equipment values below a given threshold; and
- labor regulations, especially those that make it difficult for manufacturing firms operating in the formal sector to adjust employment levels and service conditions in response to changing economic conditions.

The World Bank’s 2016 Doing Business ranked India 130 out of 189 economies, up from 142 in the previous year (Figure 2.3). The country managed to improve its ranking substantially in the subcomponents of

Figure 2.3: World Bank’s 2016 Doing Business Ranking

<table>
<thead>
<tr>
<th>Country</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Republic of Korea</td>
<td>4</td>
</tr>
<tr>
<td>Malaysia</td>
<td>18</td>
</tr>
<tr>
<td>Japan</td>
<td>34</td>
</tr>
<tr>
<td>Thailand</td>
<td>49</td>
</tr>
<tr>
<td>People’s Republic of China</td>
<td>84</td>
</tr>
<tr>
<td>Indonesia</td>
<td>109</td>
</tr>
<tr>
<td>India</td>
<td>130</td>
</tr>
</tbody>
</table>

getting electricity and starting a business. However, the bureaucratic burdens of dealing with construction permits, registering property, paying taxes, trading across borders, enforcing contracts, and resolving insolvency are still prevalent. India needs to introduce the computerization of records to facilitate the registration and transfer of property. Simplifying and reducing the number of required procedures at both the central and state levels for setting up a business is crucial in order to further advance India’s ranking and realize potential gains in economic growth and job creation.

Tackling market failures is also important. Market failure is often the result of coordination failure, which occurs when a group of firms could achieve a more desirable equilibrium but fail to do so because they do not coordinate their decision-making. If not addressed by public policy, coordination failures can hinder the development of new sectors and delay the growth of existing ones.

If not addressed by public policy, these market failures can hinder the development of new sectors and delay the growth of existing ones.

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34 World Bank. 2016. Doing Business 2016. Washington, D.C. In the subcomponent “Getting Electricity,” India’s rank jumped to 70 in 2016 from 137 in 2015 among 139 countries ranked. The report notes that “[the] utility in Delhi made the process for getting an electricity connection easier and quicker by eliminating the internal wiring inspection by the Electrical Inspectorate. The utility in Mumbai reduced the procedures and time required to connect to electricity by improving internal work processes and coordination.” The country’s “Starting a Business” ranking is based on the business environment in Delhi and Mumbai, with a weighting of 53% and 47%, respectively. India’s ranking for starting a business improved to 155 in 2016 from 158 in the previous year on account of eliminating the minimum capital requirement and the need to obtain a certificate to commence business operations.
delay the growth of existing ones. For example, the development of a modern food processing industry can be stymied by a lack of infrastructure for postharvest preservation of fruits and vegetable, and modern storage facilities such as cold storage and warehouses.

Other sources of market failure include credit market imperfections that prevent small firms and new entrepreneurs from capitalizing on good ideas, and a host of learning externalities that dampen firms’ investments in new technologies and worker training. If not addressed, market failures will prevent private sector firms from making needed investments. Thus, the role for public policy in tackling these factors is as important as providing the necessary infrastructure.

Connecting the Smaller Firms

One way in which inadequate infrastructure, over-regulation, and market failures have held back Indian manufacturing is by encouraging firms to remain small with operations confined to the informal sector. At very small scales of production, firms are often unable to adopt modern, productivity-enhancing production and managerial technologies; innovate and invest in the skills of their workers; and serve dynamic and growing markets.

It is quite typical for countries at India’s stage of development to have a large informal sector and many small firms. However, MSMEs are far more prevalent in India and account for a much larger share of total manufacturing employment than is the case among India’s peers in East and Southeast Asia (Figure 2.4, panel a). MSMEs in India contribute

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35 Ministry of Micro, Small, and Medium Enterprises. 2011. Fourth All India MSME Census, 2006–2007. New Delhi. For the comparability of India with other developing countries in Figure 2.4a, micro, small, and medium-sized enterprises have been defined based on the employment size. The Ministry of Micro, Small, and Medium Enterprises defines MSMEs as follows: in manufacturing, micro-enterprises are those investing Rs2.5 million ($40,000) or less in plant and machinery, small are those investing over Rs2.5 million to 50 million, and medium-sized are those with investments over Rs50 million to Rs100 million. For the services sector, micro-enterprises are those that invest Rs1 million or less on equipment, small are those that invest over Rs1 million to Rs20 million, and medium-sized are those that invest over Rs20 million to Rs50 million.
Figure 2.4  Manufacturing Employment in India Concentrated in Micro, Informal, Low-Paying, and Unproductive Firms

OAME = own-account manufacturing enterprises.

Notes: Micro and small: 1–49 workers in all countries except Thailand (1–50 workers); Medium: 50–199 in all countries except in Thailand (51–200 workers); Large: 200 or more workers in all countries except in Thailand (more than 200 workers).

* India’s manufacturing employment includes workers in own-account manufacturing enterprise.

** Includes imputation for the self-employed based on differentials between LFS and enterprise survey/census data.

*** Data on microenterprises for the Republic of Korea are not available.

larger firms can become more productive by sourcing cost-competitive parts and components from MSMEs through domestic production networks and GVCs.

almost 10% of GDP and account for around 45% of manufacturing output and 30% of exports. An estimated 36 million MSMEs provide work for around 80 million people. The vast majority of MSME workers are employed by smaller and less productive microenterprises in the informal sector (Figure 2.4, panel b), tend to be poorly paid (Figure 2.4, panel c), and lack skills. About 95% of all registered MSMEs are microenterprises. With less than Rs2,500,000 invested in machinery and equipment, these enterprises serve local markets within a few kilometers of their location. Little is known of the quantity and quality of their output, or of their sales profiles, since they are not registered, even with district industry centers. Employment terms in India also vary considerably with enterprise size, largely reflecting laws and regulations aimed at larger firms that cover employee protection, collective bargaining, and the minimum wage.

Generally, larger firms and those in the formal sector tend be more productive and employ more skilled workers than smaller firms in the informal sector. If the future expansion of textiles and food processing sectors in VCIC were to be driven by large and more productive enterprises in the formal sector through an appropriate set of policies, then job growth would more likely be accompanied by wage growth.

However, this is not to suggest that MSMEs do not have an important role to play in the industrialization process. Larger firms can become more productive by sourcing cost-competitive parts and components from MSMEs through domestic production networks and GVCs. Many

39 The literature has put forward different possibilities for why a firm-size premium in wages may exist once deviations from competitive product and factor markets are allowed. One reason is that efficiency wages that induce greater effort from workers and/or sharing of surplus of production increase with firm size and revenues. Formal sector firms and large firms have larger capital stocks that typically translate into higher capital intensity, and thus higher efficiency wages and/or larger surpluses.
large enterprises increasingly rely on raw materials and parts supplied by homegrown MSMEs in East and Southeast Asia. India has yet to tap this potential.

In low-income developing countries, MSME participation in GVCs is concentrated in the agricultural sector and labor-intensive, low value added manufacturing and service activities where entry costs are low and the production process is not capital intensive.\textsuperscript{40} However, the spread of GVCs has increased links between the more formal large enterprises and the less formal small and medium-sized enterprises. Formal sector firms are increasingly subcontracting work to informal sector firms.

The development of VCIC could serve as a catalyst in linking MSMEs to large enterprises through value chains. Industries such as automotive components and beverages are already rife with informal firms, which are involved in myriad subcontracting arrangements with larger firms.\textsuperscript{41}

\textsuperscript{40} OECD and World Bank Group. 2015. Inclusive Global Value Chain Policy Options in Trade and Complementary Areas for GVC Integration by Small and Medium-Sized Enterprises in Low-Income Developing Countries. Report prepared for submission to G20 Trade Ministers Meeting Istanbul. 6 October.

Addressing Binding Constraints to Industrial Performance in Vizag–Chennai Industrial Corridor

In creating the right kind of environment for VCIC industries to thrive, the Government of India and the Government of Andhra Pradesh not only need to address the inadequacy of infrastructure, but must also tend to other factors, such as the regulatory framework and a skills shortage, that negatively impact industrial performance.

Commending Efforts to Improve the Business Environment

Momentum is gathering in favor of establishing a business-friendly regulatory environment to strengthen domestic firms and attract FDI. The Companies Act, 2013 aims to promote self-regulation and facilitate entry and exit into the marketplace by introducing concepts such as a one-person company, small company, and dormant company. The act also promotes investor protection and transparency by defining insider trading, allowing class action suits, and creating a National Financial Reporting Authority and Serious Fraud Investigation Office.42 Social protections for employees were given a boost with the introduction of a universal social security scheme in the Union Budget 2015–2016 that includes pensions for the elderly, life insurance, and medical insurance.

State-level policies in Andhra Pradesh to promote industrial development in the 1980s and 1990s through a range of fiscal incentives have been deemed to be ineffective. However, the Government of Andhra Pradesh’s policy regime has achieved more recent success, often receiving a boost from nationwide policy reforms (Box 2.3).

Andhra Pradesh saw a shift in its agricultural production basket away from food grains and traditional commercial crops to higher-value commodities—including horticulture, milk, meat and eggs, and marine products—from the early 1990s to mid-2000s. While urbanization drove some of this shift, government policies were also important, especially the introduction of farmers markets; reforms to the state Agricultural Produce Market Committees Act, 2003; and public assistance for adopting modern technologies.

Unbundling the state electricity board and slowing tariff increases in the early 2000s likely contributed to increasing industrial output. While among the more flexible (i.e., pro-employer) states in India with regard to labor regulations, Andhra Pradesh had one of the most problematic power sectors prior to these reforms, which removed a major constraint to expanding industrial production in the state.

Improved industrial production can also be linked to passage of the National Tariff Policy, 2006, which called for limiting cross-subsidization of different categories of customers and the use of direct subsidies. The Industrial Single Window Clearance Act, 2002 also appears to have played a part in arresting 4 consecutive years of contraction in registered manufacturing in 1997–2000.

In both the agriculture and industrial sectors of Andhra Pradesh, the policy framework mattered. For agriculture, market developments resulting from urbanization, policy reforms, and government support for new technologies led to a shift to higher-value commodities. For industry, a combination of strengthening the business environment and reforming the power sector led to expanded output.

Scaling New Heights: Vizag-Chennai Industrial Corridor, India’s First Coastal Corridor

Promoting Skills Development

Study team discussions with stakeholders revealed that in order to develop VCIC into a dynamic industrial hub and integrate its industries with GVCs, enough skilled, semiskilled, and unskilled labor is essential. Of course, skill requirements vary across industries. For example, many jobs in ICT-enabled services, textiles and leather, and chemicals and pharmaceuticals require skilled workers. However, there is a shortage of skilled workers in VCIC and an over-supply of minimally skilled ones.

The Skill India initiative is a national project that aims to train over 400 million people in different skills by 2022. Pradhan Mantri Kaushal Vikas Yojana aims to offer 2.4 million Indian youth meaningful, industry relevant, and skill-based training. Upon completion of the training and assessment, trainees will be provided with a financial reward and a government certification, which will help them in securing a job for a better future. The other components of Skill India include the National Policy on Skill Development and Entrepreneurship, National Skill Development Mission, and the Skill Loan Scheme. The National Policy on Skill Development and Entrepreneurship aims to meet the challenge of training people at scale with speed and quality.\(^\text{43}\) The National Skill Development Mission will provide a strong institutional framework at the central and state levels for implementation of skills training activities.\(^\text{44}\) The Skill Loan Scheme will provide loans over the next 5 years to youths seeking to attend skill development programs.\(^\text{45}\)

In addition to these large-scale skill initiatives, the Apprentices (Amendment) Bill, 2014 expanded the provision of apprenticeship training

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\(^\text{43}\) It also seeks to provide an umbrella framework to all skilling activities being carried out within the country, and to align them to common standards and market-align them to the needs of the industry. The National Skill Development Mission will provide a strong institutional framework at the Centre and States for implementation of skilling activities in the country.

\(^\text{44}\) The mission will have a three-tiered, high-powered, decision-making structure. At its apex, the mission’s Governing Council, chaired by the Prime Minister, will provide overall guidance and policy direction. The Steering Committee, chaired by Minister in Charge of Skill Development, will review the mission’s activities in line with the direction set by the Governing Council. The Mission Directorate, with the Secretary, Skill Development as Mission Director, will ensure implementation, coordination, and convergence of skilling activities across central ministries, departments, and state governments.

\(^\text{45}\) Under the Skill Loan scheme, loans ranging from Rs5,000–Rs150,000 will be made available to 3,400,000 youths seeking to attend skills development programs over the next 5 years.
to non-engineering graduates and diploma holders, and includes new trades, such as ICT-enabled services, allowing more employers to participate in the training and employment of such workers.

Since about 70% of the total population resides in rural areas, it is not possible to guarantee formal wage employment to everyone. The central and state governments need to provide rural youth with training in entrepreneurship development programs and opportunities for livelihood generation and self-employment.

The Ministry of Micro, Small, and Medium Enterprises aims to upgrade the relevant skills of existing and potential entrepreneurs. It has national entrepreneurship development institutes in Hyderabad and Guwahati that offer regular entrepreneurship and skills development training courses. The ministry also assists state governments, industry associations, and nongovernmental organizations to set up training institutions for first-generation entrepreneurs and help them establish enterprises. Working with the Asian Development Bank, the ministry’s Khadi and Village Industries Commission has provided policy, technical, and marketing support to promote khadi (handspun or hand-woven cloth) and village industries, with the ultimate aim of reviving the khadi industry, which employs close to 90 million people in rural nonfarm activities.

The Entrepreneur Development Institute seeks to increase the supply of entrepreneurs through education, training, and research. Other entrepreneurship schemes include the Rajiv Gandhi Udyami Mitra Yojana, which provides guidance in preparing project reports, arranging finance, selecting technology, forming marketing tie-ups with buyers, and dealing with required paperwork; and the National Small Industries Corporation, which aims to create self-employment opportunities by training the unemployed.

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Revitalizing the Regulatory Framework for Vizag–Chennai Industrial Corridor

“The important thing for government is not to do things which individuals are doing already, and to do them a little better or a little worse; but to do those things which at present are not done at all.”

—John Maynard Keynes
The End of Laissez Faire, 1926

Improving the regulatory framework in Vizag–Chennai Industrial Corridor (VCIC) will require changes in regulations and policies at the state level to attract industries and advance employment opportunities. This could involve simplifying existing regulations through amendments and improving the flexibility of existing provisions or adding new provisions. Policy changes at the state level should be complemented by the policies of the central government.

Success in upgrading the regulatory framework in VCIC hinges on four conditions:

- easing the processes for setting up a business and closing a business,
- streamlining regulations and compliance to improve the business environment,
- streamlining logistics and trade facilitation, and
- synchronizing industrial-urban development to ensure that jobs are available and people's living needs are met.

The last aspect may seem the most intractable, but the recent policy reforms of the central government offer hope for progress.
Easing the Process for Setting up a Business

Too many regulations at different levels of government (central, state, and local) stymie the motivation of entrepreneurs and investors. Over-regulation results in entrepreneurs spending an inordinate amount of time securing clearances, licenses, and approvals from government agencies when setting up and running a business. Rent-seeking behavior can further weaken confidence and break down trust between entrepreneurs and public sector agents.

Advancing Much-Needed Reforms

Several promising developments are underway at the national level. The government has declared its intent to improve India’s low ranking in the 2016 World Bank Doing Business survey, lifting the country from its current position of 130 into the top 50 (Box 3.1). The government launched an eBiz portal in 2014 to integrate 14 regulatory permissions in one place and facilitate the ease of starting and operating a business. The eBiz portal is an online platform that aims to provide a Single Window clearance mechanism through which businesses can apply for all required start-up approvals, thereby minimizing red tape and improving transparency.

The Ministry of Finance announced a number of measures in the Union Budget 2015–2016 to make the environment conducive to starting a business, including reducing the process for online central excise and service tax registration to 2 working days, streamlining supervisory institutions by merging the Forward Market Commission and Securities and Exchange Board, and undertaking other legislative measures such as passing a bankruptcy law. In presenting the Union Budget 2016–2017, the finance minister announced the introduction of a bill in Parliament to amend the Companies Act, 2013.49 Among other things, the amendment is targeted to improve the enabling environment for start-ups and to ensure that the registration of companies can be completed in a single day. In February 2016, the government-appointed Companies Law Committee suggested nearly 100 amendments to the

49 The Union Budget of India for 2016–2017 was presented on 29 February 2016.
Open for Business?

The complexity of India’s regulatory regime is evident in the country’s overall ranking in the 2016 World Bank Doing Business survey. According to the survey results, India still lags behind all other members of the BRICS—Brazil (116), Russian Federation (51), the People’s Republic of China (84), and South Africa (73)—despite efforts to ease the process of doing business. While India has made progress in improving its ranking from 142 in 2015 to 130 in 2016, it has a long way to go before it features in the top 50. India is among the top 50 economies in only two Doing Business indicators: Getting Credit (42) and Protecting Minority Investors (8). Other initiatives to simplify the start-up process for a business (e.g., developing a single application form for new firms and introducing online registration for tax identification numbers) were still ongoing as of 1 June 2015, the cutoff date for the 2016 survey.

India owes its recent gains in the World Bank’s Doing Business ranking primarily to an improvement in two indicators—Getting Electricity and Starting a Business—resulting from, (i) the simplification of procedures to reduce the time required for securing electricity connections, and (ii) an amendment to the Companies Act, 2013 that eliminates the requirement for a certificate to commence business operations.

In New Delhi, one of the two cities assessed under the World Bank study, the process for getting an electricity connection was made simpler and faster through the elimination of the internal wiring inspection requirement. In Mumbai, the other city in India covered under the study, the procedures and time required for an electricity connection were reduced through an improvement in internal work processes and coordination.

For other indicators, such as Enforcing Contracts and Dealing with Construction Permits, India continues to have a low ranking. In a number of measures, such as Registering Property and Getting Credit, the country slipped in ranking from 2015 to 2016.

Companies Act, 2013 to make it easier to do business in India, including simpler laws for incorporating a company and raising funds, and with respect to insider trading rules.50

With respect to enforcing contracts, the Commercial Courts, Commercial Division, and Commercial Appellate Division of High Courts Act, 2015 was recently passed to enable the setting up of dedicated adjudication mechanisms for commercial disputes in order to speed up the process.

In July 2015, the Government of India launched the Digital India initiative to ensure that public services are made available to citizens electronically by creating digital infrastructure, delivering services digitally, and promoting digital literacy. Delivering government services digitally includes Single Window access for all citizens through the seamless integration of departments and jurisdictions, accessing government services online and via mobile platforms, and making financial transactions electronic and cashless.

50 The Ministry of Corporate Affairs constituted the Companies Law Committee in June 2015 for examining and making recommendations on the issues arising out of implementation of the Companies Act, 2013. The Committee was chaired by the Corporate Affairs Secretary and submitted its report on 1 February 2016. The panel also had nominees from the Reserve Bank of India, Securities and Exchange Board of India, and industry bodies; as well as from the Institute of Cost Accountants of India, Institute of Chartered Accountants of India, and Institute of Company Secretaries of India.
While central government reforms are crucial to strengthening the economy, it is equally imperative to implement reforms to ease the opening and operating of a business at the state level. A significant chunk of the regulatory burden imposed on businesses is generated by the myriad regulations and procedures enforced by the states. This gives rise to a host of registrations, licenses, and “no objection certificates” that businesses must obtain and file compliance returns on. A recent report published by the Department of Industrial Policy and Promotion included a comprehensive assessment of state-level implementation of business reforms covering 29 states in India (Box 3.2).

**Box 3.2 Andhra Pradesh and the Ease of Doing Business**

A study published by the Department of Industrial Policy and Promotion in September 2015 provides insight into regulatory practices across Indian states and how they are implementing business reforms. Andhra Pradesh was ranked second, after Gujarat, in the overall ranking of Indian states (Figure B.3.2). It has attained a place in the Aspiring Leader category, meaning that an implementation status of 50%–75% has been achieved. No states have yet reached the Leader category, which requires an overall implementation status of at least 75%.

While Andhra Pradesh’s achievements are commendable in the criteria of Single Window system, spot approvals of various registrations, labor, land, and tax reforms, it needs to improve in four additional criteria to achieve an implementation status of at least 75%: adoption of electronic courts, reforms in construction permits, extending the coverage of the existing Single Window system, and publication of detailed information on processing municipal solid waste authorization.

continued on next page

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51 A “no objection certificate” is a type of legal certificate issued by any agency, organization, institute, or, in certain cases, an individual, that states there is no objection to the covenants of the certificate. This certification is used by most government departments in India.
Facilitating the Process for Closing a Business

In a dynamic economy, there are firms that are expanding and firms that are contracting. It is essential to ensure that there is flexibility in the reallocation of resources from firms that are contracting to those that are growing. The regulatory environment should ensure that such reallocation is possible and that resources are put to optimal use.

**Box 3.2 continued**

**Figure B.3.2: Business Reform Implementation Status (%)**

<table>
<thead>
<tr>
<th>State</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gujarat</td>
<td>71</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>70</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>63</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>62</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>62</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>61</td>
</tr>
<tr>
<td>Odisha</td>
<td>52</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>49</td>
</tr>
<tr>
<td>Karnataka</td>
<td>49</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>47</td>
</tr>
</tbody>
</table>

* The report ranks Indian states on a 98-point action plan that covers the broad categories of setting up a business, allotting land and obtaining construction permits, complying with environmental procedures, complying with labor regulations, obtaining infrastructure-related utilities, registering and complying with tax procedures, carrying out inspections, and enforcing contracts.

In India, there is a need to simplify exit regulations. Investors have highlighted the difficulty of winding up businesses in the event of distress or bankruptcy. This pertains to the absence of an efficient bankruptcy system to enable investors to recover their money at the earliest, especially in the light of a company facing financial difficulties. In addition, there is a need to ensure that norms for worker retrenchment and layoffs are simplified. This deters both domestic and foreign investors because of the fear that it would not be possible to dismiss unproductive workers or to downsize during an economic downturn. The aim is to provide more flexibility to firms to respond to dynamic market conditions such as new technologies and a changing business environment. This does not mean that the law should not protect the income security of workers. The objective is to be fair to workers and ensure that they get increased benefits in case of a retrenchment.

Tackling India’s Rigid Exit Norms

India’s insolvency regime has drawn much attention globally. The country ranked 136 out of 189 in the 2016 World Bank Doing Business survey in terms of resolving insolvencies, mainly due to delays in decisions coming from insolvency officials and courts or tribunals.
The Industrial Disputes Act, 1947 has rigid provisions, including compulsory and prior government approval in the case of layoffs, retrenchment, and closure of industrial establishments employing more than 100 workers. This clause applies even when there is good reason to shut down or when worker productivity is very low. Furthermore, the Contract Labour (Regulation and Abolition) Act, 1970 states that if the job content or nature of work of employees needs to be changed, 21-day notification must be given and the consent of the employees is required, which can be difficult to obtain. While the right of workers to form a union is important, certain aspects of the Trade Union Act, 1926 have led to a multiplicity of unions and the considerable influence of outside members, with adverse consequences on industrial relations at the company level and ultimately on industrial investment and growth.

In the Union Budget 2015–2016, the finance minister announced the setting up of a Bankruptcy Law Reform Committee. The central government is also keen to develop an entrepreneur-friendly, legal bankruptcy framework for MSMEs that will enable easy exit. The crux of the committee’s recommendations was that companies should not be forced to continue operating solely for the purpose of preventing unemployment. The committee also recommended amendments to the Companies Act, 2013 for a faster liquidation process and to ensure that creditors have a say in determining the viability of a company. These reforms are needed to make the country a global manufacturing hub.

The Government of India subsequently introduced the Insolvency and Bankruptcy Code Bill in Parliament in December, 2015 for ratification and enactment. The bill provides for the time-bound completion of insolvency resolution procedures and the setting up of an apex regulator, together with appropriate adjudication authorities for all insolvency- and bankruptcy-related matters.

Exit reforms are needed to make the country a global manufacturing hub.

India’s business exit policies remain inflexible, which also makes it difficult to attract new investments. The central government is working on bankruptcy reform, including the introduction of a specialist corporate court, so that high barriers to exit do not put off businesses from investing in India.
Recognizing Promising Labor Reform Initiatives

Labor reform initiatives that have been taken up by several state governments are promising. Since labor laws come under the concurrent list, subject to the President’s assent, state laws prevail over central laws. The state of Rajasthan has used this route to introduce the following labor reforms:

- amending the Industrial Disputes Act, 1947 to allow firms with up to 300 employees (compared with 100 previously) to undertake layoffs without government approval to provide flexibility to a large number of companies for hiring and laying off workers in order to adjust to existing supply–demand scenarios;
- increasing the membership required to form a trade union from 15% to 30% of total employees, thereby limiting the number of trade unions within a company and reducing inter-union conflicts;
- amending the Factories Act (Definition of a Factory), 1948 to increase the threshold limit of employment for factories operating without electrically powered machines from 20 to 40 employees, and for factories operating with electrically powered machines from 10 to 20 employees in order to reduce the compliance burden on companies and allow management to focus on production, innovation, and harnessing efficiencies; and
- making the Contract Labour (Regulation and Abolition) Act, 1970 applicable only to companies that employ more than 50 workers, compared with 20 previously.

Pushing for Labor Reforms

Taking a cue from the Government of Rajasthan, the central government has taken up the controversial issue of retrenchment and layoffs and decided to amend the Industrial Disputes Act, 1947 by merging it with two other laws on industrial relations and would allow larger firms to lay off workers without prior approval. The Labour Code on Industrial Relations Bill, 2015 proposes to amalgamate three labor laws: the Trade Unions Act, 1926; Industrial Employment (Standing Orders) Act, 1946; and Industrial Disputes Act, 1947. According to the bill, firms employing up to 300 workers would be permitted to undertake layoffs without prior government approval, compared with the current threshold of 100 workers.
Also at the central government level, the Ministry of Labour and Employment has set up the Shram Suvidha portal to simplify labor law compliance for firms and establish transparency and accountability in inspections and enforcement (Box 3.3).

**Box 3.3 Shram Suvidha Portal**

*Shram Suvidha* is a single unified web portal set up by the Ministry of Labour and Employment to allow online registration of business units, reporting compliance, submission of returns, and reporting of inspections. The objective behind the portal is to consolidate information on labor inspections and enforcement, leading to greater transparency and accountability. For firms, compliance through a single harmonized form simplifies the process. As part of the process, a unique Labour Identification Number is allotted to each establishment and it will be commonly recognized across all implementing agencies. The portal is currently operating on a pilot basis and covers aspects of 16 labor laws. State governments are expected to eventually participate in the unified single web portal.

Streamlining Regulations and Compliance

The firm owner has to move inputs and outputs across borders, whether within a state (e.g., between districts) or between states. The owner is likely to face formidable constraints such as varying value-added and entry tax rates on the same goods in different states; multiple inspections at different times and locations, both between and within states; and nonstandard inspection procedures that create openings for rent-seeking behavior.

To meet these challenges at both the intra- and interstate level, policy reforms to streamline business operations should harmonize tax rates and policies via goods- and area-based tax exemptions; set up integrated check posts involving multiple state government departments instead of separate departmental check posts at interstate borders; and adopt joint manning and common inspections at interstate borders by officials from the relevant state governments. The proposed Goods and Services Tax (Box 3.4) is a step in this direction.

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**Box 3.4**

How Will the Goods and Services Tax Benefit Indian Traders and Manufacturers?

The Goods and Services Tax (GST) will subsume all indirect levies on goods and services made by the central and state governments, including entry taxes. The proposed implementation of the GST, a value-added tax, could be a boon for Indian businesses by simplifying the taxpaying process and facilitating the movement of goods and services across borders:

**Simplified common tax.** The GST will subsume 16 central and state taxes, making compliance easier for traders and manufacturers.

**Common market.** At present, traders and manufacturers avoid interstate transactions owing to the liability of paying the Central Sales Tax (CST), which is not credited at the stage of manufacture or in the course of trading. With the gradual withdrawal of the CST and entry taxes, high-quality products manufactured in one part of the country will be able to reach markets in other parts of the country.

**Entry tax.** The abolition of entry taxes will lead to the free movement of goods across state boundaries and reduced delays in deliveries of goods and services.


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53 And internationally, in some cases, but that is not discussed here.
New business facilitation measures include the Union Budget 2015–2016 reforms under which taxpayers will be allowed to issue digitally signed invoices and maintain electronic records. Furthermore, the time limit for taking a central value-added tax credit on inputs and input services is being increased from 6 months to 1 year.\(^{54}\) The eBiz platform mentioned above will make all business and investment clearances and compliances available on a 24x7 basis through a single portal with an integrated payment gateway. It is expected that all central government departments and ministries will integrate their services with the eBiz platform.

**Streamlining Logistics and Trade Facilitation**

**Ports and Shipping**

India has a coastline of 7,517 kilometers with 12 major ports, of which four—Jawaharlal Nehru Port Trust, Kandla, Kochi, and Visakhapatnam—handle around 82% of total seaborne cargo. The average capacity utilization of these four ports is more than 100%, which is well above the internationally accepted norm of 70%. This has resulted in higher congestion levels and increased preberthing times, which lead to higher average turnaround times. The central government has taken a two-pronged approach to resolving this situation, which includes both regulatory reforms and policy changes.

**Major Ports Authorities Bill, 2015**

The Ministry of Shipping has invited suggestions for the draft Major Ports Authorities Bill, 2015, which replaces the Major Port Trusts Act, 1963. Key features of this bill include greater freedom to use port assets, including land; expanded scope for port trusts to undertake management restructuring to become a company; and greater financial powers with respect to raising loans for investments or working capital. Tariff regulation has been a topic of considerable debate. Through successive notifications, the tariff regime has been liberalized substantially. Based on the notification issued in January 2015, the scale of rates of major ports will now be indexed annually to

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\(^{54}\) The central excise duty is assessed on the manufacture and production of goods in India. Under the announced reform (i) industries will have 1 year within which to routinely assess, track, and avail themselves of credits for inputs and input services; and (ii) assesses may avail themselves of all credits due under invoices issued in the past year. More information is available at [http://www.idt.taxesutra.com/experts/column?sid=132](http://www.idt.taxesutra.com/experts/column?sid=132)
inflation to the extent of 100% of the variation in the Wholesale Price Index from 1 January 2014 to 1 January of the relevant year. The access to indexation benefits has been linked to port performance. With this regulation, the major ports will have increased flexibility in pricing their services and be able to compete effectively with the nonmajor ports.

**Port development policies and initiatives**

The *Sagarmala* initiative aims to enhance the capacity of major and nonmajor ports and modernize them to make them more efficient.55 Further, it targets efficient evacuation from and to hinterlands through optimal use of multi-modal evacuation systems involving road, rail, and inland and coastal waterways, as well as the establishment of logistic hubs. Through this program, fiscal and nonfiscal support is provided to ports and state governments to undertake projects in three broad categories: port modernization, efficient evacuation systems, and coastal economic development. For public–private partnership (PPP) projects, the Ministry of Shipping has acted to streamline the bid process of terminals within major ports and for greenfield ports. The model concession agreement for greenfield ports was published in April 2014 and subsequently used for the development of the Vizhinjam Port in Kerala. State governments now have the opportunity to develop greenfield ports through a PPP project by using model documents that have been ratified by various stakeholders. This has helped in shortening the bid process timeframe and reduced the risk involved in formulating project agreements.

Last mile connectivity and evacuation at ports are a major challenge making hinterland transportation inefficient and slow, thereby leading to delays in cargo movement and higher logistic costs. The Government of India has approved setting up a special purpose vehicle for all major ports through creation of Port Infrastructure Vikas Nigam, which will construct, operate, and maintain rail and road infrastructure to facilitate linkages between ports and hinterlands. The 11 major ports of India (90%) and Rail Vikas Nigam (10%) will fund the company. Andhra Pradesh has been fairly successful in developing greenfield ports through the PPP route (Box 3.5).

55 The *Sagarmala* initiative of the Ministry of Shipping was announced by the Prime Minister in September 2014.
Other policies and incentives
The Government of India has allowed 100% foreign direct investment under the automatic route for port development projects, along with income tax incentives and 10-year tax holidays to facilitate capacity expansion projects at the ports. Port procedures associated with cargo movement are still dependent on manual processes for many aspects. This leads to delays and adds to turnaround times.

The central government has initiated several measures to strengthen the existing centralized web-based portal to facilitate the secured electronic exchange of information among port stakeholders.

For example, an applicant seeking transshipment permission has to file a manual application with supporting documents.
The central government has taken steps to ease cabotage restrictions for special vessels to attract interest from shipping lines.

**Development of coastal shipping**

In the last 5 years, coastal cargo has grown at a compound annual growth rate of only 0.3%. The share of coastal shipping in total domestic cargo movement in India is just 2%, compared with 15% in the United States and 43% in the European Union. Reasons include India’s cabotage rules, which prevent the movement of cargo between two Indian ports by a foreign vessel, and a lack of separate berthing facilities for coastal ships. The central government has taken steps to ease cabotage restrictions for special vessels, such as roll-on roll-off and hybrid roll-on roll-off, for a period of 5 years to attract interest from shipping lines. Such vessels now only need one-time permission from the Directorate General of Shipping to operate in Indian coastal waters. The government is also considering a proposal to develop an Integrated National Waterways Transport Grid, which would develop five national waterways with sufficient depth and hinterland connectivity to facilitate the coastal movement of cargo. The Parliament has passed the bill for conversion of 106 inland waterways into national waterways in addition to existing 5 national waterways. Once it is a law, it can provide an alternative form of transporting goods, which at present is dominated by road and rail. Transportation by waterways is not only environment-friendly but also cost effective as it costs Rs1.50–Rs2.50 by kilometer to carry a cargo by road or railway, whereas it only takes Rs0.25 per kilometer to carry a cargo via water transport.57

**Trade Facilitation**

Trade facilitation deals with the simplification and harmonization of procedures and controls governing the movement of goods across national borders to rationalize associated cost burdens and maximize efficiency in trade. Trade facilitation has a significant positive impact on trade flows and improves industry competitiveness.

In the 2016 World Bank Doing Business survey, India ranked 133 out of 189 countries in the indicator for Trading across Borders. In order to improve India’s ranking, the central government has identified measures for reducing the mandatory number of documents and proposed procedural and system improvements for undertaking exporting and importing. Some of these interventions are already underway.

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57 The Economic Times. 2016. India to harness 50,000 km of waterfront, raise Rs 70,000 crore. 13 March.
Process and system improvements

A key initiative undertaken by the Government of India is reducing the number of mandatory documents for exporting and importing to only 3 from the current requirement of 7 (exporting) and 10 (importing). This has been achieved by (i) merging two document requirements (commercial invoice and packing list) into a single document, (ii) eliminating certain documents required by the Reserve Bank of India (foreign exchange control forms) and Ministry of Shipping (terminal handling receipt), and (iii) making certain documents such as the technical standard certificate applicable only in select cases.

The streamlined list of mandatory document for exports and imports include:

(i) bill of lading or airway bill,
(ii) commercial invoice cum packing list, and
(iii) shipping bill or bill of exports (exports) and bill of entry (imports).

Trade facilitation is influenced by the efficiency of operations at ports and other customs stations. At present, only 126 of the 344 ports or customs points through which India’s exports and imports take place are Electronic Data Interchange-enabled. Therefore, only a part of India’s export and import data is captured by the Electronic Data Interchange. For exports, 88.6% of all transactions, accounting for 65.2% of total value, occur at enabled ports or customs points, with the remaining data transmitted to the Central Board of Excise and Customs with a greater time lag. Limited integration of various systems like the special economic zone (SEZ) online system, which is used to capture exports and imports through SEZs, with the Indian Customs Electronic Commerce/Electronic Data interchange Gateway (ICEGATE) system used by the Central Board of Excise and Customs to track excise taxes, results in manual data exchanges, and processing delays.

The government has identified the need to convert non-Electronic Data Interchange custom points to Electronic Data Interchange ones. This will help spread acceptance of digitally signed supporting documents, such as export invoices and packing lists, and remove the need for submitting digital signatures.

Trade facilitation is influenced by the efficiency of operations at ports and other customs stations.

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58 This has been achieved by (i) merging two document requirements (commercial invoice and packing list) into a single document, (ii) eliminating certain documents required by the Reserve Bank of India (foreign exchange control forms) and Ministry of Shipping (terminal handling receipt), and (iii) making certain documents such as the technical standard certificate applicable only in select cases.

59 The Electronic Data Interchange enables the domestic trading community to exchange documents electronically with the Central Board of Excise and Customs and other government agencies.
physical documents. A complete automation of the business processes involved in cargo clearance, including use of risk management systems and prearrival filing and processing of declarations, will significantly reduce cargo evacuation times.

**Institutional mechanisms**

The process of securing a no objection certificate for clearance of export and import consignments requires interactions with multiple government department and agencies, and involves the physical submission of documents, drawing of samples, and lab testing. This leads to duplication in data sets filed and multiple inspections of the same goods by different agencies, resulting in additional costs and delays.

To address this, an electronic National Single Window (NSW) mechanism is being developed by the Central Board of Excise and Customs in association with concerned departments and agencies. The NSW will include an IT-based system for document filing, work-flow based processing, and risk management for drawing samples for testing. It will help provide integrated and timely responses from all regulatory agencies involved in cargo clearance to reduce evacuation times and compliance costs. The NSW could be integrated into eBiz, the platform offering core
government-to-business services. There should be close coordination between port developers and the Central Board of Excise and Customs to ensure regulatory compliance in design, adequate staffing, and sufficient ICT facilities to spur optimal and timely utilization of the infrastructure.

**Focus on promoting specific trader programs**

The following measures focus on promoting specific trader benefits that could further enhance trade facilitation by boosting the efficiency and productivity of VCIC ports.

A streamlined trusted-trader program to support VCIC manufacturers with a facility for the deferred payment of duties will expedite cargo clearance and help better manage financial flows. Agreements between India and its main trading partners on mutual recognition of Authorized Economic Operators would enable facilitation of compliant traders across the supply chain.

To enable traders to manage their supply chains and logistics efficiently and to decongest ports, a variety of options for cargo clearance should be made available, including clearance at factory, inland container depot, container freight station, gateway port, and bonded warehouses, among others. For this purpose, the transshipment of containers should also be allowed from a gateway port to a container freight station of another customs station. The use of container freight stations should be monitored by the Central Board of Excise and Customs and the port authorities to ensure that they are used only in circumstances where the ports lack space and/or facilities to handle specific shipments. To clearly map the business processes in the key ports of VCIC, and to identify the bottlenecks to be addressed and steps to increase port competitiveness, studies that follow global practices such as a time release survey and business process analysis should be conducted.

Studies on trade facilitation show that the private sector also contributes to avoidable delays and increased transaction costs. This underscores the importance of raising awareness and building capacities in the private sector, particularly with regard to small and medium-sized enterprises, to ensure that the benefits of a facilitative environment created by a sound regulatory regime are harnessed optimally.
Nicda will address interstate issues, support planning and development, provide world-class governance, and manage urban services.

Setting up a Management Authority

To address many of the above issues, a new institutional mechanism, such as an apex authority, is recommended. A National Industrial Corridor Development Authority has already been proposed by the Department of Industrial Policy and Promotion to address interstate issues, support planning and development, provide world-class governance, and manage urban services. This apex authority should be empowered to engage in agreements with utility service providers; approve new industrial parks and SEZs; harmonize tax rates; integrate departmental interstate check posts; adopt standardized regulations; craft and enforce common minimum standards for developing, running, and maintaining key transit infrastructure; facilitate trade; and share best practices.

Synchronizing Industrial and Urban Development

The existing governance system in India treats urbanization and industrialization as distinct processes requiring different management systems. While industrialization and urbanization have proceeded together in many places, in India, industries have moved away from the core cities as governments offered incentives for relocation to less-developed areas, polluting industries were forced to relocate outside cities, and land became more costly and difficult to consolidate in urban areas. In addition, city governments generally do not consider local economic development as part of their mandate and therefore do not actively promote industrialization.

This type of scattered industrialization has had several impacts. In many cities, industries moved out but the workforce stayed. Having lost their industrial jobs, the workforce shifted to informal services sector opportunities. In most cases, the new industrial locations did not have planned urban development or even adequate workforce housing. Haphazard development mushroomed around these new industrial locations to cater to workforce accommodation and absorb the multiplier effect of industrial growth. The result is that we now have a dichotomy: urban areas with inadequate industrialization and industrial areas with insufficient urban development.
A regional strategy for synchronizing urbanization and industrialization is required, along with other major initiatives for economic development. Such a strategy should link existing industrial clusters and urban areas with new industrial hubs and urban centers through infrastructure networks, the most important one being transportation. This will enable the corridor development process to effectively use the capital, human resources, and infrastructure available in existing settlements to build new centers.

**Addressing the Difficulty of Securing Land for Industrial Development**

One of the most significant challenges for industrial development is acquiring land at prices that largely reflect the predevelopment price yet also allow original landowners, and authorities, to share in the capital gains on the land. Land pooling is one option that has been successful in two Indian states, Gujarat and Haryana, which offer successful models of land acquisition (Box 3.6).
Land acquisition is a contentious subject in India, where small holdings by families with no source of income other than farming are common. However, urban development authorities and state governments in Gujarat and Haryana have been successful in acquiring land for urban development.

**Dholera Special Investment Region in Gujarat**

The largely self-governing Dholera special investment region (SIR) in the state of Gujarat comprises a huge area of 920 km² and a developable area of nearly 570 km². The SIR Development Plan, which covers the SIR’s industrial areas and core, includes a Town Planning Scheme for about 6,600 hectares. The original landowners give up a portion of their agricultural land holdings in return for a somewhat smaller plot (roughly 50% of their original holdings) that is regular in shape and part of a properly planned and serviced urban layout. Since the plot now has more amenities, its price has probably risen to match the market value of the owners’ original landholding. In addition to the developed land in return for the original land, landowners are also provided a yearly compensation depending on the quality of land for a fixed tenure. For farmers, this is an appealing alternative to land acquisition. Under the standard process of land acquisition, the original landowner loses all his land to the authorities in return for a compensation that might not seem fair or justifiable. In land pooling, besides obtaining a portion of developed land, the owners are also entitled to additional monetary compensation.

**Land Acquisition and Land Pooling Policies in Haryana**

The Department of Urban Estates, Haryana acquires land for developing urban areas. Under the Land Acquisition Policy, 2010, landowners can receive developed residential and commercial plots instead of cash in return for their land, with flexibility in the cash−plot ratio. Landowners can also exercise other options for compensation, encouraging them to get involved in the land’s development. The Haryana policy has been hailed as one of the fairest and most people-friendly in India, with measures that enable farmers to benefit from the upside of development.

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**km² = square kilometer**

a At such a scale, these complexes need to accommodate not just industries, but also a large variety of activities to support them, including large-scale utilities (e.g., power, water, wastewater, and effluent treatment); logistics; commercial facilities; hotels; offices; convention centers; workforce housing; recreational facilities; and social infrastructure.

b Landowner interests are protected by provisions for minimum floor rates (five zones in state—Rs2 million, Rs1.6 million, and Rs0.8 million per acre) to ensure payment of market-linked compensation; bonuses (30% solatium and 20% bonus on nonlitigation agreements); plus benefits under the policy, including skills development and jobs, as well as payment of an annuity for a period of 33 years (from Rs21,000 per acre per annum to Rs42,000 for private land for a special economic zone).

c Instead of taking the plots, the applicant can, for example, also claim the value of the entitled developed land at the allotment rates applicable at the time of launching the residential sector.

Although the Andhra Pradesh Industrial Infrastructure Corporation (APIIC) is the state-level entity that usually plans industrial areas, it does so without reference to urban planning, a situation similar to Gujarat’s before the Special Investment Region (SIR) Act. The Centre for Good Governance in Hyderabad, for example, strongly recommends reintroducing town planning in Andhra Pradesh. The question is whether Andhra Pradesh has in place the necessary legal framework for planning, developing, and managing industrial areas, including land pooling.

The Government of Andhra Pradesh can prepare and implement Town Planning Schemes under the Andhra Pradesh Town Planning Act, 1920 and Development Plans under the Andhra Pradesh Urban Areas (Development) Act, 1975. The Industrial Area Local Authority gives local authority status to APIIC in the industrial areas it creates. APIIC assembles land for these areas primarily by using the large tracts of government land it already has and by acquiring land. There is no dedicated legal provision for land acquisition by industries. In addition to these existing legal provisions, the Andhra Pradesh Capital Region Development Authority Act, 2014 (APCRDA Act) has introduced land pooling mechanisms in a new format.

In December 2014, the state government introduced a land pooling model as part of new legislation for creating a new capital city. The APCRDA Act incorporates provisions for three area development mechanisms, all of which allow for land pooling in some form. Of these, the Land Pooling Scheme is of particular interest as it involves voluntary participation of landowners, who get developed residential and


61 Tamil Nadu has the Tamil Nadu Acquisition of Land for Industrial Purposes Act, 1997. The Karnataka Industrial Areas Development Act, 1966 has a chapter on land acquisition with special provisions for expediting the acquisition process. The Andhra Pradesh Urban Areas (Development) Act, 1975 has a provision to create Special Development Authorities, such as the Cyberabad in Hyderabad and the Visakhapatnam–Kakinada PCPIR. Once one is created, a development plan is prepared and notified for the whole area, designating development zones for industrial and urban use.

62 In 1994, the government amended several acts to create the Industrial Area Local Authority system. However, the current framework for this system has no provisions for planning and development.
commercial plots as well as monetary compensation in return for the land they surrender. In January 2015, the state government issued rules for the Land Pooling Scheme through the Andhra Pradesh Capital City Land Pooling Scheme (Formulation and Implementation) Rules, 2015. These rules have been amended and clarified several times since being formulated. The compensation formula is summarized in Table 3.1 based on the latest version available at the time of writing.

Table 3.1: Summary of Andhra Pradesh Land Pooling Scheme

<table>
<thead>
<tr>
<th>Land (final plot area allocated per acre of original holding)</th>
<th>Category</th>
<th>Dry</th>
<th>Jareebu(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Patta(^b)</td>
<td>Residential</td>
<td>1,000 yd(^2)</td>
<td>1,000 yd(^2)</td>
</tr>
<tr>
<td></td>
<td>Commercial</td>
<td>200 yd(^2)</td>
<td>450 yd(^2)</td>
</tr>
<tr>
<td>(b) Assigned</td>
<td>Residential</td>
<td>800 yd(^2)</td>
<td>800 yd(^2)</td>
</tr>
<tr>
<td></td>
<td>Commercial</td>
<td>100 yd(^2)</td>
<td>200 yd(^2)</td>
</tr>
<tr>
<td>Monetary Compensation</td>
<td>(c) Yearly payment for 10 years</td>
<td>Rs30,000</td>
<td>Rs50,000</td>
</tr>
<tr>
<td></td>
<td>(d) Yearly increase</td>
<td>Rs3,000</td>
<td>Rs5,000</td>
</tr>
<tr>
<td></td>
<td>(e) One-time additional payment for gardens like lime, sapota, guava, amla, and jasmine (malle)</td>
<td>Rs100,000</td>
<td></td>
</tr>
</tbody>
</table>

yd\(^2\) = square yards.

\(^a\) Jareebu pertains to highly fertile land adjoining the rivers.

\(^b\) Patta refers to non-assigned land.


As shown in Table 3.1, as part of the land pooling scheme, farmers are divided into two main categories: patta (non-assigned lands) and assigned lands. These two categories are further classified into dry lands and jareebu (highly fertile lands adjoining the river stream). For an acre
of land taken over by the government, the farmers will get a fraction of developed land depending on the category.63

The rest of the land, following the allocation of developed plots to landowners, is to be used for the development of roads, infrastructure (physical and social), open spaces, and various public purpose developments such as the new capital complex. This approach has similarities with those in the states of Gujarat and Haryana. The APCRDA Act, 2014 applies only in the capital region. However, if the new legal and institutional framework is successful in the capital, the legal provisions, particularly the new ones, could be inserted in statewide legislation.

Reconciling the Competing Objectives of Industrial and Urban Development

Industrial development promotes urbanization, a certain level of which is necessary to support industrialization. Manufacturing and other modern economic activities require a local resident workforce coming from various strata of society. Over time, such economic activities generate a multiplier effect, giving rise to a whole ecosystem of subordinate production, supply chains, and services. Urban centers foster this development, while also requiring a strong economic base upon which to thrive. Both short- and long-term strategies are needed for sound urban development (Box 3.7).

63 For the non-assigned dry land, farmers will get an equivalent of 1,000 yards² of residential plots and 200 yards² of commercial plot. For the non-assigned Jareebu land, they will get 1,000 yards² of residential and 450 yards² of commercial plot per acre after development once the pooling process is completed. However, the farmers will not be allowed to grow crops here. For the assigned dry land, farmers will get 800 yards² of residential and 100 yards² of commercial plot. For the assigned Jareebu land, farmers will get 800 yards² of residential and 200 yards² of commercial plots. In addition, monetary compensation in the form of annual rent will be paid to the farmers: Rs30,000 for the dry land and Rs50,000 for Jareebu land for 10 years. Every year, there will be an increase in the rent in the amount of Rs3,000 and Rs5,000 for the dry and Jareebu lands, respectively. Furthermore, a one-time additional payment for gardens like lime, sapota, guava, amla, and jasmine (malle) will be paid to the farmers.
One of the key aspects of the successful planning of the Dholera SIR in Gujarat is the presence of a governing structure that brings industrial and urban planners together in a manner unlike the uncoordinated and haphazard approach that is common to the development process across India. An industrial area has infrastructure management needs quite different from those of the surrounding area, and its relevant development agencies or industrial departments are focused on the economics of setting up and running industrial facilities. If these agencies have much interest in urban infrastructure needs it is generally confined to seeing that workers have basic housing, usually without any wider social amenities. It is therefore not surprising that new industrial sites, emerging away from towns, can spawn urban agglomerations that quickly turn into slums.
The default response is for industrial departments to promote new housing near new industries, with little regard for the impact on existing settlements. This blinkered mentality arises because development in India is run almost exclusively under the direction of state industrial departments, leaving urban development departments little say in planning.

Even in Gujarat, where an integrated approach is most evident, the Industries and Mines Department enacted its own legislation, the SIR Act, incorporating the useful provisions of the Gujarat Town Planning and Urban Development Act. To manage the SIR, the state government employed retired town planning officials or poached serving ones. In effect, the Gujarat Industries and Mines Department subsumed all urban development functions, at least in the context of new industrial development. On the other hand, municipalities and town planning agencies focus on land use by allocating areas for residential, commercial, and recreational use; and on municipal services. It is not part of their mandate to develop local industry, and they rarely seek to attract firms by providing infrastructure and delivering services to workers and their families.
Supporting Integrated Regional Planning

Through integrated regional planning, it is possible to synergize urban and industrial development to meet the many challenges described above. A regional strategy for urbanization and industrialization is required, along with other major initiatives for economic development. The development of integrated urban–industrial complexes is also necessary. Two good examples of this include Sri City, discussed earlier in Box 1.2, in Andhra Pradesh and Mahindra World City near Chennai. These planned cities, which were mandated by the government and developed by the private sector, have attracted investment from large national and global firms. Andhra Pradesh is now in the process of developing a planned city, in the form of a new capital, using lessons learned from the development of Sri City and Mahindra World City.
Industrial nodes are an integral part of economic corridor development. When equipped with comprehensive infrastructure support and a business-friendly environment, nodes are hubs geared to cradle industries. After several rounds of analyses, four industrial nodes were identified in Vizag–Chennai Industrial Corridor (VCIC) based on the following criteria: availability of land for developing new industrial clusters, current level of industrial agglomeration, proximity to urban centers and seaports, rail and road connectivity, and power and water availability (Figure 4.1).

**Figure 4.1: Methodology for Node Selection**

1. List of industrial parks and special economic zones (SEZs) drawn up, including those owned by the private sector and the Andhra Pradesh Industrial Infrastructure Corporation

2. Vacant land in industrial parks and SEZs assessed and 119 parcels of land identified for consideration as industrial nodes

3. Requirements for identified land:
   - In excess of 500 acres or over 2,000 acres of land in proximity (<30 km–35 km) to existing industrial agglomerations
   - Location removed from coastal regulation zone, forests, restricted areas, and flood-line areas
   - Availability of water (groundwater-safe zone or access to surface water)
   - Existing industrial agglomeration (Rs100 million of investment within a 50-km radius since 2000)
   - Not already under consideration for Master Planning under the Chennai–Bengaluru Industrial Corridor

continued on next page

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“The if there is one single area of economics in which path dependence is unmistakable, it is in economic geography – the location of production in space.”

—Paul Krugman

History and Industry Location: The Case of the Manufacturing Belt
Addressing Land Acquisition Issues

One of the criteria in the node selection process is the availability of land for developing new industrial clusters. The difficulty of acquiring land has long been a stumbling block to developing industrial areas in India, as exemplified by the Delhi–Mumbai Industrial Corridor (DMIC). Referred to as the “hold-out problem,” it can occur when a single buyer has to negotiate in sequence with many sellers for contiguous plots of land. Once the buyer begins acquiring plots, subsequent sellers are motivated to hold out for increasingly higher prices, potentially undermining the viability of a development project. Meanwhile, enforced land acquisition for development—whether through compulsory purchase or eminent domain—is a contentious and protracted process in India given that the threat of a court challenge can cause significant delays.

VCIC has many industrial parks and special economic zones (SEZs), both existing and planned, that will allow investors to sidestep the unwieldy land acquisition process.

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65 The Economist. 2015. The fight over India’s land laws. 20 April.
66 The city of Indore is one such example in which the government did not have a land bank and therefore struggled to acquire land needed for the development of DMIC.
and the Government of Andhra Pradesh have compiled a list of public and private industrial parks, and SEZs, with vacant land available for industrial development (Table 4.1).

Operationally, the four VCIC nodes will need either government-owned land to be assigned to them or for the land to be acquired through cooperation with private landholders. In cases where land is held by private entities, memorandums of understanding will need to be signed to facilitate planning for the unhindered development of the nodes.

### Table 4.1: VCIC Nodes and Clusters

<table>
<thead>
<tr>
<th>Node</th>
<th>Cluster</th>
<th>Status of Land Availability</th>
<th>Key Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vizag</td>
<td>Pydibhimavaram</td>
<td>202 hectares to be acquired or reassigned</td>
<td>Pharmaceuticals, metallurgy, chemicals and petrochemicals, and food processing</td>
</tr>
<tr>
<td></td>
<td>Bheemunipatnam</td>
<td>850 hectares held by the Government of Andhra Pradesh (AP)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Atchutapuram</td>
<td>1,862 hectares held by the Government of AP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nakkapalli</td>
<td>243 hectares held by the Government of AP, 1,376 hectares to be acquired</td>
<td></td>
</tr>
<tr>
<td>Kakinada</td>
<td>Kakinada</td>
<td>Privately held</td>
<td>Food processing, chemicals and petrochemicals, and paper</td>
</tr>
<tr>
<td>Gannavaram–Kankipadu</td>
<td>Gannavaram</td>
<td>223 hectares held by the Government of AP, 708 hectares to be acquired</td>
<td>Pharmaceuticals, metallurgy, textiles, and food processing</td>
</tr>
<tr>
<td></td>
<td>Kankipadu</td>
<td>1,295 hectares to be acquired or reassigned</td>
<td></td>
</tr>
<tr>
<td>Srikalahasti–Yerpedu</td>
<td>Yerpedu and Srikalahasti</td>
<td>3,359 hectares in Musalipadu, Empedu, and Chintalapalem to be reassigned or acquired</td>
<td>Metallurgy, food processing, textiles, and electrical equipment</td>
</tr>
<tr>
<td></td>
<td>Sri City</td>
<td>Privately held</td>
<td></td>
</tr>
</tbody>
</table>

VCIC = Vizag-Chennai Industrial Corridor.

Source: Study team discussions with the Andhra Pradesh Industrial Infrastructure Corporation.
Describing the Four Industrial Nodes

Through the node selection process, the study team has identified four industrial nodes. VCIC’s northernmost node is centered around the ports of Vizag and Gangavaram, and the industrial activities in their immediate hinterlands. Moving south, the two nodes in the central region are primarily greenfield. The northerly of the two central nodes is centered around the port of Kakinada and the urban centers of Kakinada and Rajahmundry. The southerly of the two central nodes extends from Gannavaram to Kankipadu, with Vijayawada as the major urban area. This node serves the surrounding industrial clusters and will have access to the port of Machilipatnam. The southern node is close to the urban centers of Tirupati and Nellore—the port cluster from north of Chennai to Krishnapatnam—and the industrial zones in their immediate hinterlands including, notably, Sri City (Figure 4.2).

Figure 4.2: VCIC Nodes, Clusters, and Districts

VCIC = Vizag–Chennai Industrial Corridor.
Source: Andhra Pradesh Industrial Infrastructure Corporation.
The four districts encompassing the VCIC nodes together account for around two-thirds of Andhra Pradesh’s (prebifurcation) manufacturing gross domestic product (GDP). Vizag is the top contributor to the state’s manufacturing output with a 38% share of the total (Figure 4.3). Vizag also has the highest value-added at Rs1 million per employee. Meanwhile, East Godavari and Krishna each generate about 18% of Andhra Pradesh’s employment. Vizag is home to capital-intensive sectors like chemicals and petrochemicals, while East Godavari and Krishna are home to employment-intensive sectors like food processing and textiles.

![Figure 4.3: Contributions to Manufacturing Output and Employment in Andhra Pradesh, and Labor Productivity](image)


**Vizag—The Most Industrially Developed Node**

Vizag is the 15th largest city in the country, the third largest city on the east coast of India, the largest city in Andhra Pradesh, and has the highest per capita income in the state. Several factors have contributed to its growth, including a natural harbor and rail, road, and air connectivity to domestic and international destinations. This node is set to be the anchor for industrial development in the corridor, with access to the eastern and central hinterlands of India.

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67 The share of manufacturing sector to district GDP is highest in Vizag (22%), followed by East Godavari (13%), Chittoor (9%), and Krishna (7%).

Vizag encompasses five mandals (subdistricts) and hosts a number of different industries—some of which are located in SEZs and industrial parks—that have had a presence in the city since the 1970s. Vizag is well-connected by road and rail. The node has two operating ports, each with a container terminal and multiple bulk-handling terminal, and is home to the largest airport in the state.

Major investments in Vizag have been made in and around the three major industrial clusters of Atchutapuram, Nakkapalli, and Bheemunipatnam. The major industries and clusters include Atchutapuram SEZ, Brandix India Apparel City, Divi’s labs, Hetero Drugs, Hindustan Petroleum Corporation, Jawaharlal Nehru Pharma City (Ramky), National Thermal Power Corporation, and Visakhapatnam Steel Plant. These industries account for over 60% of total investment in Vizag.

Vizag is a center for education in Andhra Pradesh as it is home to several universities and specialized institutes, as well as a number of primary and secondary schools. The city’s literacy rate was 82.3% in 2011, compared with the national average of 74.0%. The Indian Maritime University is pioneering training in naval architecture, maritime technology, and port and shipping management in support of India’s high-potential maritime industry. In 2015, a branch of the Indian Institutes of Management was established in Vizag, making Andhra Pradesh the only state with two of these flagship postgraduate institutes in India.

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Footnote 67.
Kakinada—Land and a Deep-Draft Port Ripe for Development

Kakinada’s economy is relatively diverse due to the presence of the seaport and its associated industries. The further development of Kakinada will focus on its port and the indigenous production of ICT hardware. The central government recently identified the city as a hub for hardware manufacturing in Andhra Pradesh. The district of East Godavari, within which Kakinada is located, is home to the Sarpavaram SEZ where software firm Cyient (formerly Infotech Enterprises) is operating. The local ICT institutes and polytechnic and engineering colleges have the potential to meet the human resources requirements of this hardware cluster.

As the administrative headquarters of and largest city in East Godavari district, Kakinada has a planned SEZ and well-established industrial parks that include Kakinada, Peddapuram, Thammavaram, and Vakalapudi; and is part of the proposed PCPIR. Land for the SEZ has been acquired and plans are underway for port construction. In May 2015, the Kakinada SEZ signed a memorandum of understanding with a Chinese consortium to facilitate $3.5 billion worth of investments in manufacturing units for power equipment, electronics, wind and solar energy, and smart technologies.70

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70 The Economic Times. 2015. Chinese companies to set up units at GMR SEZ, to invest $3.5 billion. 18 May.
Known as the “Fertilizer City” of Andhra Pradesh, the city of Kakinada is home to two fertilizer producers: Nagarjuna Fertilizers, the largest urea manufacturer in coastal Andhra Pradesh, and Godavari Fertilizers. Over 55% of total investment in Kakinada is in the fertilizer industry. Other major firms present in the city include EID Parry (India), Coromandel International, and RAK Ceramics.

Kakinada is also an educational center in Andhra Pradesh, with professional colleges offering courses in engineering, medicine, information and communications technology, and management at the graduate and postgraduate levels. The Jawaharlal Nehru Technological University, Kakinada offers engineering courses and has a business school, while Rangaraya Medical College is a respected medical college. The city also is home to the Andhra University Postgraduate Centre.

Kakinada is well-connected by road and rail, and it is at the heart of an area of dense industrial development within a radius of 20 kilometers (km). The node is also connected to Rajahmundry, which is 70 km away and a local urban center with a population of more than 400,000. Finally, the region is in the catchment area of the Godavari river and its canals. The Godavari river can be further developed into a waterway for the speedy and cost-effective movement of goods and passenger traffic. Together with the
Krishna river, the National Waterways–4 project is designed to provide a reliable and cost-optimal logistics channel spanning three states: Andhra Pradesh, Tamil Nadu, and Puducherry.71

**Gannavaram–Kankipadu—Access to South Central Railway**

The Gannavaram node is 20 km from Vijayawada, the second largest city in the state and a candidate location for the new state capital, and about 55 km from Guntur, the state’s third largest city. The node is 40–60 km from Machilipatnam, the city that is home to Krishna’s administrative headquarters.

The majority of the people in urban areas of Krishna district are engaged in trade and commerce. There are many large industries like sugar and cement, and many small manufacturing industries, including the production of musical instruments, gold-plated ornaments, and Kondapalli toys. The district has a rich variety of soils; agriculture is the most important occupation, with paddy being the main food crop. Though over 80% of total investment in Krishna district is in the cement industry, over 55% of output comes from food processing. The major cement producers include Japee Balaji Cement, Ramco

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Cement, and KCP Cement, which together account for over 70% of the district’s investment. Most cement producers are located close to Jaggayapeta, while food processing firms are near Gannavaram and Kankipadu. The key food processing firms include Coca Cola India, Vijayawada, KCP Sugars, Vuyyuru, Balaji Agro Oils, and Kankipadu.

Among the four nodes, Gannavaram–Kankipadu has the most cities with a population of more than 100,000 and hosts to most important railway junction along the South Central Railway, providing excellent connections within the state and beyond.

Vijayawada is one of the state’s main education centers, with the Dr. NTR University of Health Sciences and School of Planning and Architecture, Vijawada. Krishna University is located in Machilipatnam. Rajiv Gandhi University of Knowledge Technologies, popularly known as the International Institute of Information Technology, is in Nuzvid. The district also has numerous engineering colleges.

Among the four proposed nodes, Gannavaram–Kankipadu has the most cities with a population of more than 100,000. In addition, Vijayawada is the most important railway junction along the South Central Railway, providing excellent connections within the state and beyond.
Srikalahasti–Yerpedu—Proximity to Tirupati’s Tourists and Chennai’s International Airport

The Srikalahasti–Yerpedu node is set to anchor development at the corridor’s southern end. Yerpedu is an extended region of Tirupati, the state’s tourism hub. The major industrial area in the node region is Sri City, a thriving industrial center. The Srikalahasti–Yerpedu node is served by multiple container terminals in the Chennai port cluster and by Krishnapatnam port.

Tirupati is also a major educational center in Andhra Pradesh, with universities and colleges, including state- and Tirumala Tirupati Devasthanams-sponsored medical, pharmaceutical, agricultural, and engineering colleges. Sri Venkateswara University is consistently ranked among the top universities in India in various surveys. Other notable universities include Padmavati Mahila Visvavidyalayam, Rashtriya Sanskrit Vidyapeetham, Sri Venkateswara Veterinary University, and more.

The Government of Andhra Pradesh has requested that the Srikalahasti–Yerpedu node be extended to include Naidupeta, bringing the node in closer proximity to Krishnapatnam port, Sri City, and Chennai. Naidupeta already has an SEZ and an industrial park. While social infrastructure is currently lacking, master planning has been done by L&T–Ramboll Consulting Engineers.

World Public Library. Tirupati (City). http://www.worldlibrary.org/articles/tirupati_%28city%29
Sri Venkateswara Vedic University, and Sri Venkateswara Institute of Medical Sciences. Tirupati also has a number of engineering and degree colleges, including Sri Vidyanikethan Engineering College, SV College of Engineering, Annamacharya Institute of Technology and Sciences, and SV Degree College. Furthermore, the central government is planning to establish an Indian Institute of Technology in Yerpedu.

Food processing, textiles, and metallurgy industries, which together constitute around 80% of the total investment in Chittoor, are all found in this node. Major players include Lanco Industries, Vinsari Fruitech, Heritage Foods (India), Stiles India, Nutrine Confectionery, Leena Textiles, Prudential Sugar Corporation, and Amara Raja Batteries.

The Srikalahasti–Yerpedu node is located 20 km from Tirupati, which attracts half of Andhra Pradesh’s tourists. Tirupati Airport, 15 km from the city center, is being upgraded to an international airport. Currently, the closest international airport is the Chennai International Airport, which is 130 km from Tirupati.

Key areas that successful industrial parks have addressed include connectivity infrastructure, logistics facilities, and skilled human resources.

Achieving International Benchmarks

While the four industrial nodes each offer the potential to realize industrial gains and deeper value-chain integration, a measure of the tasks ahead can be found in what world-leading industrial parks elsewhere have already achieved. Three such parks—Tianjin Economic–Technological Development Area Industrial Park (TEDA) and Suzhou Industrial Park (SIP) in the People’s Republic of China, and Hsinchu Science Park (HSP) in Taipei, China—have been successful in three areas that are key to developing large industrial hubs: connectivity infrastructure, logistics facilities, and skilled human resources (including research and development). These three industrial parks each have excellent links to gateways (ports and airports) through modern road and rail infrastructure, as well as to major urban centers (Table 4.2).
### Table 4.2: Connectivity in Three World-Leading Industrial Parks

<table>
<thead>
<tr>
<th>Component</th>
<th>HSP</th>
<th>SIP</th>
<th>TEDA</th>
<th>Maximum Time Required to Reach at Least One Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ports</td>
<td>None</td>
<td>Five key ports, including Shanghai (&lt; 100 km)</td>
<td>Tianjin port—one of the world’s largest (&lt; 5 km)</td>
<td>Port: 60 minutes</td>
</tr>
<tr>
<td>Airports</td>
<td>One international airport &lt; 20 min. (12 km)</td>
<td>Four international airports &lt; 2 hours (80 km–200 km)</td>
<td>Two international airports &lt; 2 hours (38 km–180 km)</td>
<td>Airport: 60 minutes</td>
</tr>
<tr>
<td>Road</td>
<td>Two national freeways</td>
<td>Five expressways and four state roads</td>
<td>10 main highways to the domestic market (0 km–60 km)</td>
<td>Highway or freeway: 0 minutes</td>
</tr>
<tr>
<td>Rail</td>
<td>High-speed network (&lt; 11.5 km)</td>
<td>Two high-speed express networks (&lt; 0 km)</td>
<td>Nine major railroads to the domestic market (&lt; 50 km)</td>
<td>Rail station: 15 minutes</td>
</tr>
<tr>
<td>Major urban center</td>
<td>• Hsinchu city center in proximity</td>
<td>• Suzhou city center (6 km)</td>
<td>• At the center of Bohai Economic Ring</td>
<td>Urban center beyond downtown: 60 minutes (HSP), 20 minutes (SIP), 90 minutes (TEDA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Shanghai (80 km)</td>
<td>• Tianjin downtown (40 km)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hangzhou (150 km)</td>
<td>• Beijing (130 km)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Nanjing (200 km)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

HSP = Hsinchu Science Park, km = kilometer, SIP = Suzhou Industrial Park, TEDA = Tianjin Economic–Technological Development Area Industrial Park.

Logistically, each of the parks has excellent warehousing facilities and international express delivery companies. TEDA has a formal transfer agreement with ports and airports, and SIP and HSP have in-house clearance facilities to cut transit times and minimize procedural delays.

Proximity to urban agglomerations, through good connectivity, also ensures the availability of skilled human resources and access to R&D centers. These three industrial parks have each established incubation areas and vocational training institutes, among other skills development centers (Table 4.3).

**Table 4.3: Human Resources Development in Three World-Leading Industrial Parks**

<table>
<thead>
<tr>
<th>Utilities</th>
<th>HSP</th>
<th>SIP</th>
<th>TEDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of skilled employees within the park</td>
<td>148,000</td>
<td>190,000</td>
<td>419,200</td>
</tr>
<tr>
<td>R&amp;D centers, labs, institutes</td>
<td>8</td>
<td>144</td>
<td>55</td>
</tr>
<tr>
<td>Engineering and technology research centers</td>
<td>2</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>Vocational training institutes</td>
<td>–</td>
<td>1</td>
<td>–</td>
</tr>
<tr>
<td>Incubators</td>
<td>–</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Incubation area</td>
<td>–</td>
<td>3,000,000 m²</td>
<td>480,000 m²</td>
</tr>
</tbody>
</table>

- = data not available, HSP = Hsinchu Science Park, m² = square meter R&D = research and development, SIP = Suzhou Industrial Park, TEDA = Tianjin Economic–Technological Development Area Industrial Park.

Andhra Pradesh is competitive on costs of basic inputs like water, gas, power, and labor when compared with two of the three world-leading parks (Table 4.4).

**Table 4.4: Infrastructure Utility Costs—Andhra Pradesh vs. World-Leading Industrial Parks**

<table>
<thead>
<tr>
<th>Utilities</th>
<th>Andhra Pradesh</th>
<th>SIP</th>
<th>TEDA</th>
</tr>
</thead>
</table>
| Water (excluding waste water treatment fee) | Residential users: $0.2/kl  
Industrial users: $0.7/kl | Resident users: $0.43/m³  
Industrial and transportation: $0.48/m³  
Services: $0.48/m³ | Resident users: $0.63/m³  
Industrial and transportation: $1.27/m³  
Services: $1.27/m³ |
| Power supply—metered electricity rate (average) | $0.12/kWh | $0.09/kWh–$0.15/kWh | $0.12/kWh–$0.18/kWh (peak hours) |
| Metered gas rate (Grade II natural gas) | Industrial: $0.5–$0.6/m³ | Residential: $0.35/m³  
Industrial: $0.49/m³ | Residential: $0.35/m³  
Industrial: $0.49/m³ |

kl = kiloliter, kWh = kilowatt hour, m³ = cubic meter, SIP = Suzhou Industrial Park, TEDA = Tianjin Economic-Technological Development Area Industrial Park.


The state government has also shown a commitment to proactive reforms to establish a better policy and regulatory environment. Since its bifurcation, Andhra Pradesh has implemented the following investor friendly policies:

- Online single window portal with defined timelines for application filing, tracking, and approval;
- Easing of various business related registrations by giving spot approval based on scrutiny of basic documents;
- Deemed approval for factory registration upon self-certification;
- Random allocation of inspectors and introduction of computerized risk-assessment-based inspections under various laws;
- Automated online system for registrations and renewals under various laws with no physical touch points;
- Advanced query- and layer-based web system to identify industrial land, connectivity, and infrastructure; and
- Online system for registration and return filing for value-added tax and state taxes.
Although Andhra Pradesh is second only to Gujarat in the World Bank’s ease of doing business rankings (Box 3.2), it still needs to improve on four criteria, by achieving at least 75% implementation status, to advance to the category of “Leader.”

In order for VCIC’s industrial nodes to reach their full potential, proximal gateways need to be further developed. The capacity and quality of services at gateways like ports and airports are important factors that affect logistics costs. The next chapter discusses the proximal gateways for each of the four nodes. The discussion will also cover road and rail network connectivity anchored around points along the supply chain. In addition, other urban infrastructure (e.g., power, water, sewerage, solid waste management, and urban bus transport) will be discussed.

74 The four criteria are adoption of electronic courts, reforms in construction permits, provision of additional measure to the existing Single Window system, and publication of detailed information on processing municipal solid waste authorization.
The link between infrastructure and development is not a once and for all affair. It is a continuous process, and progress in development has to be preceded, accompanied and followed by progress in infrastructure, if we are to fulfill our declared objectives of a self-accelerating process of economic development.

—Vijayendra Kasturi Ranga Varadaraja Rao, Noted Indian Economist

The importance of infrastructure in supporting industrialization and economic development is well recognized. Inadequate and inefficient infrastructure, apart from institutional inefficiencies, results in high transaction costs that prevent an economy from realizing its full growth potential regardless of the progress made on other fronts such as the ease of doing business.75

India has the world’s largest road network, totaling about 48.9 million kilometers (km), but road quality remains insufficient.76 The most visible signs of lagging infrastructure are seen in the transport system, power grid, and water and sewerage systems. Furthermore, India faces an unreliable and deficient power supply.77 For example, in the first 2 weeks of June 2015, over 1,000 city locations in Delhi had unplanned outages for more than 1 hour due to faulty transformers and damaged high-tension cables.78 The country also encounters water supply and management problems that are exacerbated by the depletion of surface water and groundwater.79

In the World Economic Forum’s *Global Competitiveness Report, 2015–2016*, which assessed the quality of transport infrastructure affecting the competitiveness of a country, India ranked poorly against its competitor manufacturing countries (Table 5.1). The report highlights that India has a long way to go in achieving an infrastructure environment that enables manufacturing competitiveness.

**Table 5.1: Quality of Infrastructure Competitiveness—India versus Manufacturing Peers**

<table>
<thead>
<tr>
<th></th>
<th>India</th>
<th>PRC</th>
<th>Republic of Korea</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of port infrastructure</td>
<td>4.0 (76)</td>
<td>4.5 (50)</td>
<td>5.2 (27)</td>
<td>4.5 (52)</td>
</tr>
<tr>
<td>Quality of air transport infrastructure</td>
<td>4.3 (71)</td>
<td>4.8 (51)</td>
<td>5.5 (28)</td>
<td>5.1 (38)</td>
</tr>
<tr>
<td>Quality of roads</td>
<td>4.1 (61)</td>
<td>4.7 (42)</td>
<td>5.6 (17)</td>
<td>4.4 (51)</td>
</tr>
<tr>
<td>Quality of railroad infrastructure</td>
<td>4.1 (29)</td>
<td>5.0 (16)</td>
<td>5.6 (10)</td>
<td>2.4 (78)</td>
</tr>
</tbody>
</table>

PRC = People’s Republic of China.

Note: Scores from 1 (worst) to 7 (best). Figures in parentheses are rankings out of 144 countries and territories.


The Vizag-Chennai Industrial Corridor’s (VCIC’s) constraints largely mirror the infrastructure challenges faced by the entire country. Improvements to physical infrastructure will be critical for enhancing VCIC’s competitiveness and connecting its industries to domestic supply chains and global value chains (GVCs). Table 5.2 presents the importance of different components of infrastructure to various industrial sectors.
This chapter discusses the infrastructure investments—transport, power, and water and sewerage—needed to complement the geographic advantages of the VCIC region and make it a seamless manufacturing environment in which industries can thrive. This chapter also discusses the importance of social infrastructure such as storm water management and public transport.

For core transport infrastructure, the study team identified macro—gateways such as ports and airports, as well as spinal and grid road and rail networks and micro—the connectivity of the nodes with important hinterland centers, gateways, and each other.

### Promoting the Vizag–Chennai Industrial Corridor Gateways

Conveniently located along India’s east coast, VCIC will link industries to both suppliers and markets. Port-led development could boost industrialization by capitalizing on the substantial opportunities made possible by efficient maritime connectivity to engage in increased trade and participate in production networks. VCIC is served by one major port at Vizag and minor ports: Gangavaram deepwater port, Kakinada deepwater port, Kakinada anchorage port, Krishnapatnam deepwater port.

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80 Port-centric logistics involves the development of a distribution center that is located at a port, as opposed to inland, bringing companies closer to the markets they serve and decreasing freight miles.

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<table>
<thead>
<tr>
<th>Industry</th>
<th>Ports</th>
<th>Airports</th>
<th>Road and Rail</th>
<th>Power</th>
<th>Water</th>
</tr>
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<tbody>
<tr>
<td>Automobiles</td>
<td>High</td>
<td>Low</td>
<td>Critical</td>
<td>Critical</td>
<td>High</td>
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<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Critical</td>
<td>Low</td>
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<td>Low</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
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<tr>
<td>Pharmaceuticals</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Critical</td>
<td>Critical</td>
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<tr>
<td>Textiles and apparel</td>
<td>Critical</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Critical</td>
</tr>
</tbody>
</table>

Source: Study team analysis.
and the captive port at Rawa. VCIC is also served by the Chennai port cluster (Chennai, Ennore, and Kattupalli) in Tamil Nadu. Machilipatnam is not yet functional. The four ports and the Chennai port cluster together handled around 220 million tons of traffic in fiscal year (FY) 2013–2014. The four ports handled a total of 115 million tons, with Vizag port alone accounting for around half of VCIC port traffic, making it the sixth largest port in the country. However, traffic at the Vizag port is on a declining trend, down from almost 65 million tons in FY 2007–2008 when it was the second largest port in India.

Figure 5.1 shows the location of proximate gateways in the VCIC region.

**Figure 5.1: Gateways in the VCIC Region**

VCIC = Vizag-Chennai Industrial Corridor.
Source: Study team consultations with state agencies in Andhra Pradesh.

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81 Deep water ports are usually developed for the usage of very large and heavily loaded ships. Anchor ports are usually designed for ships that will dock in the port, with embarkation and disembarkation conducted via the gangway. Captive ports are developed by companies that set up industries that require port facilities. They are built and owned by a single organization, and operated by its staff.

82 Government of Andhra Pradesh. Indian Ports Association, Department of Ports. Unpublished data.
Airports serve as another VCIC gateway. The VCIC region has five operational airports: Vizag, Rajahmundry, Tirupati, Kadapa, and Vijayawada. The airports are currently underutilized, which means they offer the potential to support increased economic activity. Only the Vizag airport handles both international and domestic passenger traffic. In FY 2013–2014, the Vizag airport handled just over 1 million passengers (about 72,000 international and 940,000 domestic), making it the largest airport in Andhra Pradesh. However, its share is less than 1% of the total passenger traffic in India, ranking 26th out of 47 in the country in FY 2013–2014. The Tirupati airport, the second largest in the state by traffic, handled 272,000 domestic passengers and ranked 44th in the country in FY 2013–2014. Meanwhile, Vijayawada and Rajahmundry are estimated to have handled fewer than 275,000 passengers combined in the same year, placing them among the airports with the lowest commercial traffic in the country.

Describing the Current State of Ports

One of the reasons for the poor state of container traffic in VCIC ports, as for almost all ports in India, is that container lines operate on a hub-and-spoke model. Indian ports predominantly participate in the feeder routes supporting the major shipping routes that pass through Singapore, Port Klang, Tanjung Pelepas, and Colombo. Except for Chennai, none of the ports on India’s east coast have direct services to destination ports. Instead, these ports host smaller parcel container vessels (traveling feeder routes) with an average parcel size of 2,000–3,000 20-foot equivalent units (TEUs), compared with 3,000–5,000 TEUs at a port like Chennai.

The port of Chennai is the dominant container port in the Bay of Bengal and the only one to have direct shipping calls from the top international lines in the world. All other ports in the region—including Vizag, Kolkata–Haldia, Chittagong, and Yangon—are predominantly served by feeder services from smaller operators who have a slot charter arrangement with mainline players. This results in several circular routes servicing several destinations around the coast in a window arrangement, touching one of the transshipment ports for onward movement. The lack of frequent services and competition between major lines for cargo originating in the region increases shipping costs.

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83 Airports Authority of India. Unpublished data.
Seizing Opportunities by Accelerating Cargo Agglomeration

Traffic at the minor VCIC ports is driven by bulk cargo (e.g., coal and iron ore), which accounts for more than half of the throughput, and general cargo, which accounts for about one-fourth. Container traffic covers for only 5% of the overall throughput. Vizag handles much of the container throughput in the region, reaching 5.0 million tons, or more than 250,000 TEUs in FY 2013–2014, while Krishnapatnam moved around 1.2 million tons, or about 70,000 TEUs. However, together, this accounted for only about 3% of the 10.6 million TEUs handled along India’s entire coastline.\textsuperscript{84} India’s northwest ports accounted for 68% of India’s container traffic, while southern coastline ports accounted for 19% (Figure 5.2). The Chennai cluster handled around 1.5 million TEUs, which is about 5 times the volume of all VCIC ports.

\textbf{Figure 5.2: India’s Container Traffic}

TEU = 20-foot equivalent unit, VCIC = Vizag-Chennai Industrial Corridor.
Note: Select major and nonmajor ports.
Sources: Indian Ports Association, Department of Ports. Government of Andhra Pradesh; study team analysis.

\textsuperscript{84} Government of Andhra Pradesh. Indian Ports Association, Department of Ports. Unpublished data.
Shipping lines make the choice to operate services at a port based on conditions such as certainty of cargo agglomeration, volume of inbound and outbound cargo, proximity to liner shipping routes, scope for empty containers repositioning, and feasibility for transshipment. The volume and frequency of shipping services assigned to a feeder port also depend on these factors, which are only partially within the control of the port.

Given the established nature of the shipping ecosystem around the port of Chennai, it is a challenge for the other ports to attract direct services. On the other hand, the congestion at Chennai port due to evacuation constraints will create opportunities for VCIC ports. Exploiting these opportunities will require interventions that deliver better connectivity and accelerated agglomeration of cargo from distant hinterland centers. Greenfield ports in the VCIC region are positioned to expand their sea-side, land-side, and evacuation capacities and become prominent ports in the regional route network, thereby providing better access and lower cost shipping services to users in the region.

VCIC’s strategy aims to accelerate cargo agglomeration and make its ports competitive for direct calls from major container hubs. VCIC’s strategy aims to accelerate cargo agglomeration in the region and make its ports competitive for direct calls from major container hubs by focusing on supply chain efficiency to become a leader in containerization, with increasing sophistication and value-added, tapping into industrial cargo in the hinterlands via better last-mile connectivity, and delivering efficient middle-mile connectivity to help capture traffic from neighboring and distant hinterlands and eastbound traffic.
Therefore, it is essential for VCIC to expand the port choices of container lines in order to increase traffic and become competitive for direct calls. The ports of Vizag and Gangavaram dominate the current throughput in VCIC, mainly comprising bulk cargo and low-value containerized traffic from proximate centers, and enjoy sea-side advantages and incumbent traffic. However, these ports need better last-mile connectivity and infrastructure. Medium-term issues related to available land for expansion and expected urban sprawl also need to be resolved.

Better equipped ports like Krishnapatnam would confer several advantages on the VCIC region such as a wider set of connection points and lower costs for large cargo volumes.

Capitalizing on Two Mega Container Ports

Container ports in the future will require deep drafts of 16–18 meters to host larger vessels, in addition to significant backup areas and evacuation capacity to handle increased throughput volumes, all of which pose challenges for congested ports like Jawaharlal Nehru Port Trust (JNPT) in Mumbai and the port in Chennai. Since container trade operates on a hub-and-spoke model, ports lacking the capacity to respond to these trends risk losing their status in regional route networks. While ports like Krishnapatnam have natural advantages in terms of deep drafts and the ability to expand, these are not sufficient for transforming the port into a major hub for container shipping.

As the mainline routes become populated by larger vessels with a parcel size of more than 10,000 TEUs, the current mainline vessels with average parcel sizes of 8,000–10,000 TEUs will be pushed out to the current feeder routes, or to smaller direct routes. JNPT and Chennai have draft restrictions and cannot handle these larger vessels. Consequently, vessels calling at ports like Chennai may gradually shift to better equipped ports like Krishnapatnam, which would confer several advantages on the VCIC region such as a wider set of connection points and lower costs for large cargo volumes.85

VCIC’s coast offers several advantages such as deep drafts and protected shorefronts at many ports; proximity to Southeast and East Asia; some shorefront and land-side greenfield locations largely free from urban sprawl, which allow for expansion; and spinal connectivity along the

85 Krishnapatnam has 16,000 megawatts of installed power capacity fueled by imported coal. It has separate lines for coal, iron ore, palm oil, commodities, and containers.
coast, including road (NH5) and rail (Kolkata–Chennai route). The study team recommended that two existing ports from the Vizag–Gangavaram and Krishnapatnam clusters become mega container ports to boost Andhra Pradesh’s tiny share of India’s container traffic by tapping into the industrial opportunities in the interior hinterlands.86

The port of Krishnapatnam has deep drafts, abundant developable land, good spinal connectivity, and very little urban sprawl. While its current focus is on coal for a few large users, the port is expected to see an upsurge in containerized movement owing to the development of VCIC and the Chennai–Bengaluru Industrial Corridor (CBIC), and to the gradual shift of container traffic from the congested Chennai port cluster. Meanwhile, the ports in the Kakinada cluster have some channel, draft, and land-side restrictions. While they may not be candidates for development as large ports, they are well-suited to service the captive needs of industrial users. Furthermore, the Machilipatnam port could also serve the new state of Telangana.

Several greenfield ports like Krishnapatnam are public–private partnerships with the potential to cover increased industrial output by expanding handling capacity. At the same time, the public sector also plays a role in spearheading port capacity expansion efforts as part of the larger development of VCIC’s four nodes. Port projects could also be financed through the public sector (sovereign financing), which the Asian Development Bank (ADB) is extending to governments and public sector entities.

### Outlining the Ports Projects

In order to address the problems of cargo handling capacity and connectivity, the Vizag port needs a deeper and wider channel to the inner harbor and greater distances between breakwaters to accommodate crude ships, among other improvements. Additional wagons are also needed for rail transport and there is a need to upgrade the berth facilities in Gangavaram port to accommodate Panamax vessels.

The availability of land for additional storage facilities and a lack of transport connectivity are some of the problems hindering expansion of the Kakinada port. The ADB-financed road, which runs from Rajanagaram to the Kakinada port, is also facing capacity constraints.

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Krishnapatnam has the advantage of good road and rail connectivity. The port is serving vast hinterlands—including Andhra Pradesh, eastern Karnataka, south eastern Maharashtra, and northern Tamil Nadu—and is expanding with the construction of additional berths for coal, general cargo, and containers, while upgrading its cargo handling system with dedicated cargo-specific railway sidings inside the port. Nevertheless, efficiency could still be increased by increasing container freight station capacity in the hinterlands (Table 5.3).

### Table 5.3: Infrastructure Needs of the Ports of the VCIC

<table>
<thead>
<tr>
<th>Port</th>
<th>Infrastructure Needs</th>
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</thead>
<tbody>
<tr>
<td>Vizag</td>
<td>• Deeper and wider channel to the inner harbor &lt;br&gt;• Greater distances between breakwaters &lt;br&gt;• Mechanized handling facility for dry bulk cargo &lt;br&gt;• Extension of existing container terminal in the outer harbor &lt;br&gt;• Mechanized fertilizer unloading facilities &lt;br&gt;• Additional wagons for rail transport</td>
</tr>
<tr>
<td>Gangavaram</td>
<td>• Mechanized coal berth capable of handling capsize vessels up to 200,000 DWT, with automated gantry cranes &lt;br&gt;• Multipurpose berths to handle Panamax vessels &lt;br&gt;• State-of-the-art material handling systems &lt;br&gt;• Additional rail sidings, ancillary civil works such as drainage, and mechanized stockyards</td>
</tr>
<tr>
<td>Kakinada</td>
<td>• Deeper and wider channel to the port &lt;br&gt;• Additional storage facilities &lt;br&gt;• Upgrade of equipment in the berths &lt;br&gt;• Mechanized bulk handling &lt;br&gt;• Increased connectivity to the port &lt;br&gt;• Additional berth and terminal for handling containers and another terminal for FSRUs carrying LNG imports &lt;br&gt;• Additional rail sidings outside the port</td>
</tr>
<tr>
<td>Krishnapatnam</td>
<td>• Increase CFS capacity in the hinterlands &lt;br&gt;• Construction of a berth dedicated for coal and another for multiple purposes</td>
</tr>
</tbody>
</table>

CFS = container freight storage, DWT = dead weight tonnage, FSRUs = floating storage and regasification units, LNG = liquefied natural gas, VCIC = Vizag-Chennai Industrial Corridor.

Notes: DWT is a measure of how much mass a ship is carrying or can safely carry excluding the weight of the ship. Panamax vessels are mid-sized cargo ships that are capable of passing through the lock chambers of the Panama Canal which are 1,050 feet in length, 110 feet in width, and 41.2 feet in depth. CFS represents any facility that can act as a secondary customs clearance point for cargo; some are located within the port and others are located outside of the port. FSRUs are custom-built vessels, similar to LNG carriers but with the ability to turn LNG into its gaseous form.

Source: Study team analysis.
In addition to these four ports, the Government of Andhra Pradesh has proposed the revival of Machilipatnam port (Figure 5.3) and the development of greenfield ports in Bhavanapadu, Ramayapatnam, Narsapur, Nizampatnam, and Vodarevu. Three captive ports are also proposed at the Kakinada Special Economic Zone (SEZ), Meghavaram, and Nakkapalli. The central government has also proposed a greenfield port in Dugarajapatnam. Like other infrastructure development projects in India, one of most pressing issues in port development is land acquisition. This could be addressed through a land pooling system, which was successfully carried out in the Amaravati region.

**Figure 5.3: Ports in the VCIC Region**

VCIC = Vizag-Chennai Industrial Corridor
Source: Study team analysis.

**Supporting Connectivity among Hinterland Centers, Gateways, and Nodes**

VCIC is surrounded by cargo centers in the hinterlands that will serve as sources and distribution centers for domestic cargo, and as transit centers.

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87 Of the proposed ports, Machilipatnam has already been awarded, Bhavanapadu is undergoing the bidding process, and Narsapur and Ramayapatnam are in the project development phase.
for onward movement. Two distinct requirements for connectivity to the hinterlands may arise.

First, for node-to-hinterland connectivity, while gateway connectivity can enable logistics anchored around trade, strengthening middle-mile connectivity between nodes and selected hinterland sources and distribution centers can improve domestic sourcing and distribution for manufacturing industries within VCIC.

Second, for hinterland-to-gateway connectivity, several sources of industrial production located outside VCIC may generate demand for cargo throughput via VCIC ports. Facilitation of this throughput via VCIC gateways by way of better connectivity may bestow scale advantages by helping accelerate cargo agglomeration in VCIC. However, improved connectivity will also need to be complemented by improving the logistic infrastructure, enhancing the container-handling capacities of the ports, and providing sufficient supply of rakes and trucks. These will help increase efficiency and reduce the costs of logistic infrastructure.

Six regions have been proposed as benchmark hinterland centers based on their strategic locations and industrial development potential (Figure 5.4).

*Figure 5.4: Major Hinterland Centers for the VCIC Region*

![Diagram of major hinterland centers](image)

JNPT = Jawaharlal Nehru Port Trust, VCIC = Vizag-Chennai Industrial Corridor.
Source: Study team analysis.
• Bengaluru, Tumkur–Chitradurga, and Bellary–Hospet are expected to attract major investment as they are industrial centers and part of the proposed CBIC and Bengaluru–Mumbai Economic Corridor, but for technical reasons they lack viable west coast port options.

• Hyderabad and the Nagpur–Jabalpur belt are important production and consumption centers, and are roughly equidistant to the east and west coasts. Both are connected to the North–South corridor through NH7 and can serve as cargo agglomeration centers for north and central India.

• Raipur–Bokaro–Dhanbad–Dankuni–Cutack has been proposed because it is a segment of the ECEC and, given the technical advantages of the ports in the state, industrial areas along the eastern belt can become cargo centers for VCIC ports.

Fostering Air Route Connectivity

Passenger demand for air travel in the state of Andhra Pradesh is low as demand in the prebifurcation state was generally met by the airport at Hyderabad. In FY 2013–2014, Andhra Pradesh’s four operational airports—Vizag, Tirupathi, Rajahmundry, and Vijawada—handled the equivalent of only 16% of the air passenger traffic serviced by Hyderabad airport, or less than 1% of all air passengers in India. In June 2015, a fifth airport in the state was operationalized in Kadapa as part of the central government’s efforts to promote regional and remote area connectivity.

Vizag is the only airport in the state to have registered any air freight traffic in FY 2013–2014. However, it does not handle any international cargo. As a result of the low level of incumbent demand and high level of competition from neighboring hubs, airports in VCIC have limited operations that are skewed toward domestic travel. Today, Andhra Pradesh has five operating and three proposed airports. The latter include Bhogapuram airport, which is 40 km from Vizag, and two low-budget airports in the Nellore and Kurnool districts that will operate under public–

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88 The Integrated Cargo Complex at the Vizag airport is not yet operational. In the absence of cold storage and other facilities, exporters are routing their cargo through Hyderabad and Chennai airports.
private partnerships. However, the development of the capital city of Amaravati could act as a growth catalyst for air traffic and necessitate the development of regional hubs. Any plans for airport development in VCIC should also consider the intense competition already offered by other established airports such as Chennai and Bengaluru.

Since VCIC is adjacent to three (Chennai, Bengaluru, and Hyderabad) of the top six international airports in the country in passenger and freight terms, delivering better connectivity to these three airports is a more efficient use of capital than greenfield development. Bhogapuram airport also has the potential to be such a hub, while the Nellore and Kurnool airports may be developed as feeders to serve these hubs (Figure 5.5).

**Figure 5.5: Airports in the VCIC Region**

VCIC = Vizag-Chennai Industrial Corridor.
Source: Study team analysis.

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89 Each of the airports will be built with a budget of about Rs550–Rs 850 million, compared to about Rs25 billion needed for constructing a state-of-the-art airport. Due to lower infrastructure and operational costs, these “no frills” airports should facilitate lower ticket rates, thereby increasing air passenger volume. For details, please refer to *The Hindu Business Line*. 2015. Centre gives nod for four greenfield airports. 28 December 2015.
Strengthening the Vizag–Chennai Industrial Corridor Spines and Grids

VCIC is part of the larger East Coast Economic Corridor (ECEC) stretching from Chennai to Kolkata and anchored on both the 800-km segment of NH5 between Chennai and Vizag, and the Chennai–Kolkata trunk railway line, which together form the spine of ECEC. The NH5 is linked at both ends to other industrial corridors like the CBIC and the Amritsar–Kolkata Industrial Corridor.

From Chennai, NH5 passes through Tada, Nellore, Ongole, Chillakaluripet, Vijayawada, Rajahmundry, Kathipudi, Tuni, and Anakapalli before reaching Vizag. Almost two-thirds of this stretch is near the coast, while NH5 branches inland between Ongole and Kathipudi (Figure 5.6).

Figure 5.6: VCIC’s Road Spine—Chennai–Vizag Segment of NH5

VCIC = Vizag-Chennai Industrial Corridor.
Source: Study team consultations with the Andhra Pradesh Road Development Corporation and Transport, Roads, and Buildings Department.

Designing a strong road spine is crucial for the overall competitiveness of VCIC. For example, positive effects on manufacturing plants located in proximity to the Golden Quadrilateral network have been identified whether the plants were part of any guided effort or not.90 In the node-

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centric manufacturing strategy of VCIC, the spillover effects from proximity to a strong road spine are expected to be even greater. As part of Phase I of the National Highway Development Programme, the entire stretch of NH5 was expanded to four lanes. This has smoothed the traffic flow, but the expected increase in freight traffic through VCIC ports and the location of the nodes close to the spine suggests that additional capacity will be needed. This includes a project to expand the Chennai–Vizag segment of NH5 to six lanes, which has been shortlisted as one of seven critical projects under Phase V of the National Highway Development Programme, and three critical projects for parallel access: NH214 (Kathipudi–Razole), NH214A (Ongole–Digamarru), and SH103 (Gundugolano–Devarapalli–Kovvur) (Figure 5.7).

**Figure 5.7: VCIC’s Road Spine—Alternative Access Routes Close to Central VCIC**

VCIC = Vizag-Chennai Industrial Corridor.

Source: Study team consultations with the National Highways Authority of India; Andhra Pradesh Road Development Corporation; and Transport, Roads, and Buildings Department.

The largely linear alignments of the road and rail spines need to be well connected to the grid of arterial roads and trunk rail routes, generating time- and cost-efficient linkages between the hinterlands and VCIC. NH5 is bound by major national highways, the most important of which are aligned northeast–southwest and north–south (Figure 5.8). Seven critical road projects are proposed for better connectivity between the spinal network of NH5 and other arterial highways (Figure 5.9).
Figure 5.8: Spinal and Arterial Roads around VCIC

VCIC = Vizag-Chennai Industrial Corridor.
Source: Study team consultations with the National Highways Authority of India; Andhra Pradesh Road Development Corporation; and Transport, Roads, and Buildings Department.

Figure 5.9: Proposed Road Grid

Source: Study team consultations with the National Highways Authority of India; Andhra Pradesh Road Development Corporation; and Transport, Roads, and Buildings Department.
Categorizing Rail Traffic

Indian Railways has one of the largest rail networks in the world with a route length of more than 65,000 km traversed by about 19,000 trains per day (both passenger and freight).\(^9\) Indian Railways carried 1,098 million tons of freight traffic in FY 2014–2015 and registered an average annual growth in freight traffic of 4.2% from FY 2010–2011 to FY 2014–2015. Passenger traffic registered an average annual growth of 3.0% over the same period.

An efficient railway network is critical for VCIC as a majority of the cargo from current and planned gateway ports, mining areas, and industrial nodes will be transported via rail. For both passenger and freight traffic, the (double-line electrified) rail spinal link is one of the top seven high-density railway corridors in the Indian Railways system, operating at 80%–90% utilization. The spine of the network is made up of a subsegment of the Chennai–Kolkata line and falls predominantly under the Vijayawada division of the South Central Railway (Gudur–Duvvada), with small segments falling under the Southern Railway (Chennai–Gudur) and East Coast Railway (Duvvada–Vizag). The spine provides onward connectivity to the major hinterland centers of Bengaluru, Mumbai, Nagpur, and Kolkata (Figure 5.10).

Figure 5.10: Rail Spine—Vijayawada Division of South Central Railway


\(^9\) Indian Railways, which is overseen by the Ministry of Railways, is a departmental undertaking of the Government of India.
The Gudur–Duvvada line is also one of the busiest in the Indian Railways network as determined by line capacity and utilization based on the number of passenger and freight trains accommodated in 24 hours. Capacity utilization in most segments is above 90%, while in others it is 80%–90%. In order for trains to run efficiently and avoid bottlenecks, utilization should be less than 80%. Bottleneck capacity is about 60 trains per day against average capacity of about 68–70 trains per day. Due to the high-capacity utilization of existing infrastructure, there is huge demand for an expanded rail network infrastructure. A manufacturing- and port-centric development model for VCIC will increase rail freight along and lateral to the corridor. Rail line capacity could be augmented by increasing the number of lines, rationalizing train speeds and the number of blocks, and improving signaling systems, according to the Indian Railways’ Pink Book 2014–15.

Railways are one of the most important feeder network systems as freight transport through railways is much cheaper and efficient than via road transport over long hauls. Excessive delays in the movement of freight traffic are partially due to the mixing of passenger and freight traffic on the same trains. A long-term solution for the spinal rail network of the VCIC—and the entire ECEC—may be to separate passenger and freight traffic. However, doing so would result in passenger and freight trains competing for the same tracks. Therefore, it is important to create a dedicated railway infrastructure for freight trains only. As one example, the proposed Western Dedicated Freight Corridor, which forms the backbone of DMIC, is expected to drop the transit time between the two cities from 60 hours to 36 hours.

Indian Railways is undertaking preliminary studies for two dedicated freight corridors (DFCs): (i) Delhi–Chennai via Vijayawada (2,173 km),

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92 Freight haulage in India is in most cases undertaken by freight trains only. In some cases, freight wagons are attached to passenger trains. Freight trains, passenger trains as well as passenger trains with freight wagons, compete for the same track infrastructure; however, the passenger trains are usually accorded priority of passage. Owing to the reduced priority and also the long distance nature of freight routes, the time taken for freight transport in India is high.

93 Passenger trains are usually short haul while the freight trains are long haul and thus, move faster to cover the long haul distance.
and (ii) Kharagpur—Vijayawada via Vizag (1,100 km). The 2 DFCs are now proposed in the recently approved budget for railways. Besides the Vijayawada division of the South Central Railway, five other divisions of the South Central Railway (Guntakal, Guntur, Hyderabad, Secunderabad, and Nanded) comprise the corridor’s network connectivity. Key interchange points through the Southern, Southwestern, West–Central, and East Coast Railways provide connectivity of the corridor to various hinterland centers (Figure 5.11).

**Figure 5.11: Rail Grid in the Hinterlands**

JNPT = Jawaharlal Nehru Port Trust.
Source: South Central Railway. Unpublished data.

Although the spine of the VCIC network (Chennai–Vizag) is well-connected to the corridor’s ports, evacuation to the hinterland is bottlenecked through the central interchange junctions of Guntur and Vijayawada, and at the southern junction at Gudur. The triangle formed between the junctions of Renigunta, Guntakal, and Guntur has several gaps that increase the distance between the coast and the hinterlands, and exacerbate the bottlenecks at the Guntur junction. Similarly, the transport of port cargo from the northern port cluster to the northern hinterlands is constrained by bottleneck capacity at the Vijayawada.

94 Kharagpur is an industrial city in Paschim Medinipur district of West Bengal, India. It is around 140 km. from Kolkata, the capital city of West Bengal.
junction. Nine projects identified in Indian Railways’ *Pink Book FY 2014–15* have been selected by the study team as having the potential to relieve this congestion (Figure 5.12).

**Figure 5.12: Proposed Rail Grid**

![Proposed Rail Grid](image)


**Summarizing the Transport Infrastructure Projects**

Intra- and internodal connectivity could face high levels of congestion in the short term. ADB is undertaking capacity augmentation of roads connecting the node to the port. Thus, the focus should now be on improving intranodal connectivity and hinterland connectivity. The summary of projects required in transport infrastructure development in the short-term (FY 2015–2020), medium-term (FY 2021–2030) and long-term (FY 2031–2045) is outlined in Table 5.4. An example of a short-term railways projects is a new line from Kakinada to Pithapuram. Road projects that are short-term include the 4-lane expansion of Yellamanchili–Gajuwaka while the brownfield expansion of Vizag–Pendurthi road is long-term.
### Table 5.4: VCIC Proposed Projects by Strategic Importance

<table>
<thead>
<tr>
<th>Node</th>
<th>Infrastructure</th>
<th>Short Term</th>
<th>Medium Term</th>
<th>Long Term</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>VCIC Proposed Projects by Strategic Importance</td>
<td></td>
</tr>
<tr>
<td>Vizag</td>
<td>Port</td>
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<td>1</td>
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<tr>
<td></td>
<td>Airport</td>
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<tr>
<td></td>
<td>Roads</td>
<td>14</td>
<td>5</td>
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<td></td>
<td>Railways</td>
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<td>5</td>
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<tr>
<td>Kakinada</td>
<td>Port</td>
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<td>2</td>
<td>–</td>
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<tr>
<td></td>
<td>Airport</td>
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<tr>
<td></td>
<td>Roads</td>
<td>9</td>
<td>4</td>
<td>5</td>
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<tr>
<td></td>
<td>Railways</td>
<td>–</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Gannavaram – Kankipadu</td>
<td>Port</td>
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<td>–</td>
<td>–</td>
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<tr>
<td></td>
<td>Airport</td>
<td>2</td>
<td>1</td>
<td>–</td>
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<tr>
<td></td>
<td>Roads</td>
<td>16</td>
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<td>Railways</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Yerpedu – Srikalahasti</td>
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<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Airport</td>
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<td>1</td>
<td>3</td>
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<tr>
<td></td>
<td>Roads</td>
<td>16</td>
<td>2</td>
<td>16</td>
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<td></td>
<td>Railways</td>
<td>–</td>
<td>9</td>
<td>–</td>
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<tr>
<td>Non-Nodal Corridor</td>
<td>Spinal Roads</td>
<td>3</td>
<td>7</td>
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</tr>
<tr>
<td></td>
<td>Nonspinal network roads</td>
<td>2</td>
<td>3</td>
<td>–</td>
</tr>
</tbody>
</table>

VCIC = Vizag-Chennai Industrial Corridor.
Source: Study team analysis.

### Powering Up the Corridor

The power sector plays a critical role in the smooth functioning of the economy. The availability of reliable, high-quality, and affordable power is of paramount importance in supporting the rapid growth of the domestic, commercial, and industrial sectors, and in fostering the overall economic development of the VCIC region. This section presents an assessment of expected power demand and supply in Andhra Pradesh from FY 2016–2017 to FY 2045–2046 based on an infrastructure assessment.
carried out in the four districts that will be home to the VCIC nodes. The assessment took into account the capacity of the power network to meet the requirements of future growth in light of the expected increase in industrial and commercial activity, as well as additional infrastructure requirements. This assessment will serve as a guiding framework in identifying future projects.

**Understanding the Energy Supply–Demand Gap**

At the national level, India’s electricity generation and per capita consumption of electricity are increasing. Energy shortfalls have narrowed in recent years with the energy deficit falling to 4.2% and the peak deficit to 4.5% in FY 2013–2014 from 10.1% and 12.7%, respectively, in FY 2009–2010 (Figure 5.12). Propelled by sustained economic growth and rising incomes, India is poised to face a significant increase in energy demand in the next few decades, which will necessitate greater capacity to generate, transmit, and distribute electricity.

*Figure 5.12: Energy Demand and Supply in India*

<table>
<thead>
<tr>
<th>Requirement/availability (MU)</th>
<th>Energy shortage/peak shortage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2009–2010</td>
<td>12.7</td>
</tr>
<tr>
<td>FY 2010–2011</td>
<td>9.8</td>
</tr>
<tr>
<td>FY 2011–2012</td>
<td>10.6</td>
</tr>
<tr>
<td>FY 2012–2013</td>
<td>8.5</td>
</tr>
<tr>
<td>FY 2013–2014</td>
<td>9.0</td>
</tr>
</tbody>
</table>

FY = fiscal year, MU = mega unit (1 MU = 1,000,000 kwh).


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95 The infrastructure assessment was carried out in the districts of Chittoor, East Godavari, Krishna, and Vizag.
India is geographically divided into five regions: northern, eastern, western, northeastern, and southern. In FY 2013–2014, all five regions experienced overall and peak energy shortages of varying magnitudes, even amid short-term surpluses depending on the season or time of day. The southern regional grid covers five states—Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, and Telangana—and two union territories—Lakshadweep and Puducherry. VCIC is part of the southern grid, which had the country’s highest energy and peak shortages in FY 2013–2014 at 6.8% and 7.6%, respectively (Figure 5.13).

**Figure 5.13. Energy Demand and Supply Assessment by Region, FY 2013–2014**

<table>
<thead>
<tr>
<th>Region</th>
<th>Requirement/availability (MU)</th>
<th>Energy shortage/peak shortage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td>280,000</td>
<td>6.9</td>
</tr>
<tr>
<td>Western</td>
<td>140,000</td>
<td>2.4</td>
</tr>
<tr>
<td>Southern</td>
<td>7,6</td>
<td>6.8</td>
</tr>
<tr>
<td>Eastern</td>
<td>13,000</td>
<td>1.8</td>
</tr>
<tr>
<td>North-Eastern</td>
<td>6.5</td>
<td>5.4</td>
</tr>
</tbody>
</table>

FY = fiscal year, MU = mega unit (1 MU = 1,000,000 kwh).

In the analysis of India’s energy supply–demand gap depicted in Figure 5.14, energy supply and demand between FY 2016–2017 and FY 2045–2046 were projected under two scenarios: Business-as-Usual (BAU) and a Business-Induced-Scenario (BIS). Under the BAU scenario, a power deficit will commence in FY 2029–2030, while under BIS, it would start in FY 2024–2025.

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96 The BAU scenario assumes growth in demand continues at historical rates and does not consider the impact of additional load demand from VCIC’s development. The BIS considers the impact of load demand from VCIC.
Revisiting Power Generation in Andhra Pradesh

The energy supply infrastructure in Andhra Pradesh is dominated by coal-based plants, which contribute about 80% of total supply.\textsuperscript{97} While renewable energy only contributed 8% of the total energy mix in FY 2014–2015, it is a promising area for expansion. The Andhra Pradesh Generation Company is the state’s main power producer, supplying 42% of the total energy mix, mainly from thermal and hydroelectric sources.\textsuperscript{98} The remainder comes from central generation stations and independent power producers (Figure 5.15).

\textsuperscript{97} Thermal plants also use coal as an input.

\textsuperscript{98} The power sector in Andhra Pradesh is divided into four areas; regulation, generation, transmission, and distribution. The Andhra Pradesh Electricity Regulatory Commission is the regulatory body. The Andhra Pradesh Generation Corporation deals with electricity production and maintenance, and proposes new projects and upgrades of existing ones. Other players include the National Thermal Power Corporation and other private firms. The Transmission Corporation of Andhra Pradesh (AP Transco) is the electricity transmission company of the state.
Power availability, rather than the cost of power, is the fundamental challenge in VCIC and it could be addressed by adding new generation capacity and strengthening the transmission system. It is projected that by FY 2045–2046, additional generation capacity of 30 gigawatts (GW) and 54 GW will be needed under the BAU scenario and BIS, respectively (Figure 5.16). Thus, the state utilities need a cohesive plan to provide additional generation capacity and the complementary transmission and distribution network requirements.

Adding Transmission Capacity

In terms of transmission, additional capacity needs were estimated only until FY 2020–2021. The projection for infrastructure needs beyond FY 2020–2021 was not conducted since technological advancement could result in the increased use of higher voltage levels that lead to efficiency gains. The highest voltage used by AP Transco for High Voltage Alternate Current (HVAC) power transmission over a long distance is 400 kilovolt (kV), however, power can be transmitted at higher voltage of 765 kV.

Using the demand inputs from the resource plan and the generation supply scenario, AP Transco carried out load flow studies, short circuit studies, and stability studies for the peak load and light load scenarios, and analyzed the transmission system required until FY 2024–2025 (Figure 5.17). In general, the requirement for transmission infrastructure is usually twice the available generation capacity. Therefore, AP Transco needs to update its system augmentation and network expansion projects to meet future demand.

Figure 5.17: Transmission Capacity Requirement by Substation Projections by AP Transco

AP Transco = Transmission Corporation of Andhra Pradesh, FY = fiscal year, kV = kilovolt, MVA = mega volt ampere, SS = substation

Expanding the Distribution System

VCIC, which is spread across the nine districts of Andhra Pradesh on India’s east coast, encompasses part of the area covered by two distribution companies, Eastern Power Distribution Company and Southern Power Distribution Company. Under the BAU scenario,
no additional distribution transformer capacity is required to meet the demand for power projected at low tension level (except for FY 2015–2016) since the planned capacity of distribution companies adequately covers the future low tension load (Figure 5.18). However, planned capacity is not sufficient to meet the low tension power demand projected under the BIS.

![Figure 5.18: Distribution Capacity Requirements Planned by AP Discoms (MVA)](image)

AP Discoms = Andhra Pradesh distribution companies, DT = distribution transformer, FY = fiscal year, kV = kilovolt, MVA = mega volt ampere, SS = substation.

Note: The AP Discoms are Eastern Power Distribution Company, and Southern Power Distribution Company.

Source: Study team analysis based on unpublished data from AP Discoms.

**Responding to the Need for Additional Power Infrastructure**

The analysis of future generation capacity was benchmarked against the demand forecasted by the 18th Electricity Power Survey, and gaps were identified by the study team. The energy supply in the southern region is dominated by thermal coal, which accounts for more than 55% of the overall supply capacity in the country. Power supply shortages generally result from a lack of fuel, while interregional transmission capacity is struggling to keep pace with growing demand in the southern region. An adequate supply of fuel for upcoming generation projects is the key to ensuring future energy availability in VCIC. Fuel supply tie-ups and availability require close monitoring to avoid any possible slippages in generating capacity.

The overall power infrastructure development strategy in VCIC requires a reliable, sustainable, affordable, and efficient system-based approach
Boosting Manufacturing Competitiveness—Infrastructure and Connectivity Support

To meet the challenges of rapid urbanization, it is imperative to address the challenges of building well-performing cities with integrated infrastructure systems.

Addressing Urban Infrastructure Requirements

India’s urban population has almost doubled since the 1990s from 222.4 million in 1990 to 419.2 million in 2014. It is expected that the urban population will continue to grow, probably reaching one billion in the next couple of decades. While cities in India are full of vibrant activity and energy, they are also becoming increasingly disordered, complex, and congested. To meet the inevitable challenges of rapid urbanization, particularly amid the development of VCIC, it is imperative to address the challenges of building well-performing cities with integrated infrastructure systems.

Improving Water and Waste Management Infrastructure

India has been struggling to provide an ample supply of water and efficient infrastructure to address the problems of sewerage and solid waste. The country’s water supply has a coverage rate of only about 70%, is often disrupted, and suffers from low standards and poor quality. In addition, 13% of urban households do not have access to latrines, 94% of all cities and towns are unsewered, and 80% of all sewage generated is discharged untreated. About 30% of solid waste generated is not collected and/or not disposed properly. In order for VCIC to flourish, the corridor requires good infrastructure systems for water, waste collection and treatment, and sanitation.

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100 Footnote 1.
The development of VCIC will provide the impetus for incremental migration to urban and industrial areas due to the increased employment opportunities available in the nodes. Demand for water and the production of sewage and solid waste were projected under the BAU scenario and BIS. Under the BIS, Vizag and Srikalahasti–Yerpedu will account for more than 70% of the total VCIC population in 2045. Thus, it follows that the bulk of water demand, sewage generation, and solid waste output will be concentrated in these two nodes. Between FY 2015–2016 and FY 2045–2046, water demand, sewerage generation, and solid waste output will approximately triple under the BIS (Figure 5.19).

Figure 5.19: Water Demand, Sewage Production, and Solid Waste Generation Projections under BAU and BIS Scenarios from FY 2015–2016 to FY 2045–2046

Water Demand (million liters per day)

101 Population growth projections were based on the growth rates prescribed by the High Powered Expert Committee Report 2011. In the BAU and BIS exercise, the study team took into account 10 towns and cities with a population of more than 300,000 that are located within 50–60 km of a VCIC node. The cities of Vizag and Vizianagaram are part of the Vizag node. The cities of Kakinada and Rajahmundry are included in the Kakinada node. Machilipatnam, Eluru, and Gudivada belong to the Gannavaram–Kankipadu node. Chittoor, Tirupati, and Nellore are part of the Srikalahasti–Yerpedu node. By 2045, the population of Vizag and Srikalahasti–Yerpedu nodes are expected to increase by about 5 million and 3 million, respectively.

102 In the urban population projections, urban agglomerations have been considered for all cities wherever urban agglomerations exist. This is in line with the Jawaharlal Nehru National Urban Renewal Mission, a city-modernization scheme launched by the Government of India under the Ministry of Urban Development.
Ground and surface water sources supply the nodes. The Vizag and Srikalahasti–Yerpedu nodes depend mainly on surface water, while the Gannavaram–Kankipadu and Kakinada nodes rely heavily on groundwater. Given the increasing demand for water, groundwater reserves are shrinking faster than they can be replenished. At the same time, surface water is unreliable as a source as it is heavily dependent on rainfall.
VCIC has limited sewerage infrastructure networks. Among the corridor’s 48 cities, only five—Nellore, Rajahmundry, Tadepalligudem, Tirupati, and Vizag—have network coverage. Sewage treatment facilities are also underutilized as only half of VCIC households, mainly in Tirupati and Vizag, are connected to a network. The rest of the cities and towns in VCIC do not have underground sewerage networks or treatment facilities, and instead rely on septic tanks. Meanwhile, the primary collection of solid waste is done through push carts, auto rickshaws, and tractors. Secondary collection points have insufficient bins, resulting in the dumping of waste along roads or into drains.

VCIC’s coastal location makes it prone to flooding, which leads to disruptions in economic activities. Storm water drainage infrastructure is therefore critical given the nodes’ low drainage network coverage. Poor maintenance of existing drainage networks has resulted in the formation of silt and the choking of drainage lines. The lack of underground sewerage systems has worsened the situation since sullage is released into open drains, resulting in garbage choking these drains, especially during monsoon season.

Expanding the Public Transport System

VCIC needs well-functioning public transport systems. The corridor’s future demand for public transport will also be driven by an increasing population (Figure 5.20). In analyzing public transport requirements, the study team reviewed the need for different modes of transportation by focusing on three systems: a Metro system, Bus Rapid Transport (BRT), and city bus systems. The public transport system in the Vizag node is more organized compared with the other nodes. The BRT and city bus systems in Vizag are managed by Andhra Pradesh State Road Transport Corporation (APRSRTC), a state-owned road transport corporation, while the Metro system is still in the planning stages. Public transport is also available in the Srikalahasti–Yerpedu node under APRSRTC. However, the utilization of public transport remains low and additional capacity

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103 The overflowing of septic tanks is a common problem in India. In such cases, waste goes into open drains. The collection, transportation, and treatment of sewage is also not handled in an organized manner due to a lack of infrastructure and manpower among urban local bodies.
is needed. The Kakinada and Gannavaram–Kankipadu nodes lack an organized bus transport system and public transport is dominated by the Intermediate Public Transport.\textsuperscript{104} Connectivity in the node is facilitated by an intercity bus service, which is also operated by APRSRTC.

**Figure 5.20: The Demand for Public Transport under BAU and BI Scenarios from FY 2015–2016 to FY 2045–2046**

![Figure 5.20](image)

BAU = Business-as-Usual, BIS = Business-Induced Scenario, FY = fiscal year.
Source: Study team analysis.

**Filling the Gap for Additional Investments**

VCIC’s urban infrastructure strategy needs to be aligned with the needs of the corridor, including an increasing urban population in the medium- and long-term. The amount of investment needed by FY 2045–2046 is estimated to reach Rs883,640,000,000, of which more than two-thirds will be concentrated in the nodes with the largest populations, Vizag and Srikalahasti–Yerpedu (Figure 5.21).

\textsuperscript{104} Intermediate Public Transport, also known as Paratransit, refers to road vehicles for hire for flexible passenger transportation. The system does not follow a fixed time schedule.
Figure 5.21: Investment Needed for Urban Infrastructure Development by Node from FY 2015–2016 to FY 2045–2046

Among the five sectors of urban infrastructure highlighted in Figure 5.22—water supply, sewerage, solid waste management, storm water drainage, and urban bus transport—storm water drainage will require about 41% of total investment between FY 2015–2016 and FY 2045–2046. Water stagnation and the inundation of major highways such as NH5 are common. Master planning in most cities is also lacking. A total amount of Rs204,610,000,000 is needed over the next 30 years to address infrastructure and manpower capacity gaps. Water supply accounts for about one-fourth of total investment needed, mainly to address the additional demand for water treatment, storage, distribution, and increased coverage. Investment in urban bus transport involves the procurement of buses and development of bus depots. Funds for solid waste management will cover the additional infrastructure required for collection, transportation, treatment, and waste disposal.
As this chapter has detailed, improving the availability of power through increased generation, transmission, and distribution capacities is required to meet VCIC’s potential for accelerated economic development. At the same time, an expanding population and the increased migration to cities that will result from such growth necessitates urbanization strategies that provide for adequate water and transport infrastructure in and around VCIC’s nodes. These development needs can only be met through thoughtful planning and an appropriate mix of private and public investments. India’s quest for industrial development via economic corridor development...
Taking India to New Heights

Industrial Development through Economic Corridors

India’s industrial potential

India has experienced rapid structural transformation and strong economic growth in recent decades. It has emerged as one of the fastest growing economies in the world amid the current global economic slowdown. With a demographic dividend ushering in tremendous economic gains, a huge domestic market, and substantial opportunities for integration with the global economy, India has the potential to move to a higher growth trajectory.

To sustain and accelerate its growth momentum, India needs to expand its manufacturing sector, which currently lags behind that of its peers, contributing only 17% to gross domestic product and comprising merely 12% of total employment. This will require greater investment in infrastructure, regulatory reforms, skills development and technological modernization, and innovation in financing. The underlying objective should be to enable the private sector, which has been the backbone of India’s capital formation and employment generation, to fulfill its growth potential.

As part of India’s industrialization journey, the East Coast Economic Corridor (ECEC) and its first phase, Vizag-Chennai Industrial Corridor (VCIC), can spur industrial growth and unlock crucial employment opportunities. Based upon the concept of economic corridor development (ECD), ECEC presents an opportunity for sustainable development by anchoring the region’s inherent potential in integrated and holistic planning.
The economic corridor development strategy

ECD is an approach that integrates and synergizes industry, infrastructure, and urbanization through meticulous planning over a long-term horizon. In line with the government’s Make in India campaign, the ECD strategy aims to boost manufacturing by attracting foreign investment and facilitating the establishment of manufacturing hubs. Through linkages with global value chains (GVCs), ECD will contribute to the success of the Make in India initiative within its areas of influence.

ECD seeks vibrant industrial production clusters linked to urban centers and international gateways through an efficient multimodal transport network. A successful ECD strategy requires quality infrastructure and a policy framework that contributes to an efficient industrial base, attracts investments in the manufacturing sector, and facilitates production for domestic and export markets. Urban centers within a corridor are not only major markets for manufactured and imported goods, but also sources of labor, technology, knowledge, and innovation.

Port-led industrialization—coastal economic corridor

As India’s first coastal corridor, ECD hosts a number of commercially viable, deep-sea ports. Ports are the cornerstone of international trade and world economic growth, with maritime transport now accounting for nearly 85% of global demand. ECD’s long coastline and strategic location provide an opportunity to develop multiple international gateways to connect India with global markets and value chains, including the vibrant global production networks of Southeast and East Asia. Modern-day ports have evolved from their traditional role as transport centers to become an integral part of domestic and international supply chains, while often serving as self-sustaining economies in themselves.

ECD will buttress the government’s Sagarmala initiative, which seeks to develop India’s economic strength along its coastline by transforming ports, industrial clusters near the coast, and inland logistics infrastructure. ECD, with its large network of ports and burgeoning maritime industry,

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is poised to play an important role in developing world-class maritime hubs that can drive the economic development of the region and its hinterlands.

**Harnessing Key Elements of India’s First Coastal Corridor**

**Unifying the domestic market and tapping into global value chains**

In the 21st century, trade, investment, services, and intellectual property are all interconnected on a global scale. GVCs have created opportunities for countries to specialize in different slices of the production process based on their relative cost advantages and other economic fundamentals. Cross-border exchanges of parts and components, rather than final goods, have accounted for an increasing share of global trade for decades. Network products comprised nearly 70% of the total increment in manufacturing exports from East Asia from 1991 to 2011. However, the comparable figure for India was only 22%.\(^\text{106}\) India’s share in total world trade is still very low, which provides impetus for the country to increase its participation in GVCs.

In addition to linking up with the dynamic GVCs of Southeast and East Asia, the successful development of VCIC will require identifying industries with comparative advantages; and connecting micro, small, and medium-sized enterprises (MSMEs) to the corridor’s larger competitive industries.

**Revitalizing the regulatory framework**

Successful industrialization requires a vibrant economic landscape in which private businesses can thrive. Within VCIC, it is necessary to create a regulatory environment that will attract new investment, make it easier for existing businesses to grow and innovate, and create much needed jobs. Institutional changes at the central, state, and district levels can build upon a foundation of past policy achievements.

Andhra Pradesh, the center of VCIC, has made significant progress in improving the ease of doing business in the state, placing second in

the overall ranking of Indian states for the implementation of business reforms. To ensure the success of the Make in India initiative in general, and the development of VCIC in particular, additional reforms are needed to deliver a regulatory regime that attracts investment; makes it easier to set-up, run, and close a business; and facilitates links to domestic production networks and GVCs. The goal is to provide firms with more flexibility in adapting to dynamic market conditions such as new technologies, changing factor prices, and an evolving business environment.

As industrial development promotes urbanization, a successful ECD strategy should aim to synchronize these two processes to prevent scattered industrialization and haphazard urban development by providing adequate physical and social infrastructure in urban centers to meet workers’ quality-of-life needs. Model developments such as Sri City in Andhra Pradesh and the Dholera special investment region in Gujarat offer a way forward in reconciling urbanization and industrial development. On a corridor-wide basis, a new institutional mechanism could be tasked to reliably maintain infrastructure and deliver services.

**The locus of transformation—four industrial nodes**

ECD involves the development of industrial nodes as hubs that, when furnished with high-quality infrastructure and a regulatory framework conducive to a supportive business climate, will promote existing and new industries.

One of the critical criteria in identifying an industrial node is land availability. Fortunately, VCIC has many industrial parks and special economic zones, both existing and planned, that will allow investors to circumvent India’s cumbersome land acquisition process. After several rounds of analyses, four industrial nodes were selected in VCIC based on the following criteria: availability of land for developing industrial clusters; current level of industrial agglomeration; proximity to urban centers and seaport, rail, and road connectivity; and power and water availability. The four VCIC nodes are Vizag, Kakinada, Gannavaram-Kankipadu, and Srikalahasti–Yerpedu.

While these four industrial nodes have the potential to realize industrial gains and deeper value-chain integration, there are conditions that need to be met for them to enjoy the success of the world’s leading industrial parks. Each node needs to have world-class connectivity infrastructure
linking the industrial hub to gateways and urban centers, logistics facilities supportive of the efficient movement of goods, and skilled human resources and research and development facilities.

**Improving the infrastructure network**

With essential and efficient infrastructure, and effective institutional support and suitable business-enabling policies, transaction costs for businesses in VCIC will decline, thus spurring further private investment, industrial progress, and economic growth. Connecting VCIC industries to GVCs centered in East and Southeast Asia requires world-class infrastructure, logistics, and distribution facilities. Accelerating cargo agglomeration and making VCIC ports competitive for direct calls from major container hubs will offer manufacturers better links to domestic and global supply chains and markets.

Upgrading VCIC’s road and rail networks, and developing cross-connecting lateral links, will stimulate economic activities in existing and emerging clusters, and enhance logistics competitiveness. This will also provide time- and cost-efficient linkages between the hinterlands and VCIC, and secure reliable power supplies for VCIC industries by increasing power generation capacities and strengthening the transmission network.

**Greater Vision for East Coast Economic Corridor**

**Expansion and prospects for a regional corridor**

VCIC will link to subsequent ECEC initiatives along India’s east coast, spanning from Kolkata to Tuticorin. Ultimately, ECEC will be connected with other national and trans-national corridors to become part of both a domestic network and a regional corridor. The establishment of a regional corridor would lead to extensive transport connectivity and the reduction of barriers at national boundaries to enable the movement of people and goods at least cost.

The surrounding corridors that ECEC could eventually link to include the Chennai–Bengaluru Industrial Corridor; Amritsar–Kolkata Industrial Corridor; Bangladesh–People’s Republic of China–India–Myanmar Economic Corridor; Chennai–Dawei Corridor, a maritime corridor.
connecting to the Trilateral Highway; and Greater Mekong Subregion Corridor. ECEC can serve as a maritime corridor linking South and Southeast Asia. ECEC can also play a role as a spine corridor and thus, serve as a backbone for regional cooperation projects and enhance the development of surrounding areas by catalyzing additional investment from within and outside the region.

To this end, ECEC will not only support the domestic economy in its effort to accelerate industrialization, but also enable India to fulfill its huge potential to serve as a regional and global engine of growth. By facilitating greater connectivity and economic integration between South Asia and the rest of Asia, ECEC will contribute to India’s sustainable development and foster regional cooperation.

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107 The first coastal feeder service between India and Bangladesh started on 23 March 2016. India and Bangladesh signed a coastal shipping agreement in November 2015 to promote coastal shipping, enhance bilateral trade between the two countries and bring down transportation costs for export-import cargo. Source: *The Hindu*. 2016. India-Bangladesh feeder service begins. 24 March.
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Scaling New Heights
Vizag-Chennai Industrial Corridor, India’s First Coastal Corridor

The Vizag–Chennai Industrial Corridor (VCIC) spans more than 800 kilometers of India’s eastern coastline and is part of the country’s East Coast Economic Corridor. It can play a vital role in unifying the large domestic market as well as integrate the Indian economy with the dynamic global value chains of Asia and drive India’s Act East policy. VCIC will also be an important component of the government’s Make in India campaign to attract foreign investors and encourage the creation of manufacturing hubs in the country.

VCIC is expected to spur growth by augmenting existing investment in world-class transport networks, infrastructure, and industrial and urban clusters that are supported by a robust institutional framework and a competitive business environment. By linking areas that are lagging in development with dynamic industrial and urban clusters, VCIC will create employment opportunities that alleviate poverty and reduce inequality.

As a coastal corridor, VCIC can provide multiple access points to international gateways. Greater connectivity and economic integration between South Asia and the rest of Asia is likely to contribute significantly to development and foster regional cooperation as well.

About the Asian Development Bank

ADB’s vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region’s many successes, it remains home to the majority of the world’s poor. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.