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LEVERAGING SPATIAL DEVELOPMENT OPTIONS for
Uttar Pradesh

June 2014

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for
Uttar Pradesh

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Prepared for:

Department of Industrial Policy and Promotion
Ministry of Commerce and Industry

Ministry of Urban Development
Government of India

and

Department of Infrastructure and Industrial Development
Government of Uttar Pradesh

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The main rail corridors in India are part of the 'Golden Quadrilateral' connecting New Delhi, Mumbai, Chennai and Kolkata. They account for 16 percent of the railway network's route length but carry more than 60 percent of its freight load. Recognizing that the rail sector urgently needs to add capacity to these routes, the Government of India has, therefore, approved a long-term plan to build dedicated freight-only lines, parallel to the existing Golden Quadrilateral passenger and freight mixed traffic routes. The new freight network will allow trains to carry more freight, faster, with greater reliability and at lower cost. The relief on the existing lines will allow improvements in passenger services. On completion, the total corridor railway capacity will double, thereby unleashing further economic activities and job growth.

The first two Dedicated Freight Corridors (DFCs) to be built were the Western and Eastern Corridors. The Western Corridor (Delhi-Mumbai), which is 1,499 km long and funded by the Japan International Cooperation Agency (JICA), is in the early stages of implementation. The Eastern Corridor is 1,839 km in length and extends from Ludhiana to Kolkata, traversing the states of Punjab, Haryana, Uttar Pradesh, Bihar, Jharkhand and West Bengal. The World Bank support for the Eastern Dedicated Freight Corridor (EDFC) was conceived as a series of projects in which three sections (total length 1,176 km, including the Khurja-Dadri section) would be delivered sequentially, but with considerable overlap in their construction schedules. The first loan (EDFC1) in the EDFC Program was approved by the World Bank in May 2011 and is already being implemented. The second loan (EDFC2) for the line from Kanpur to Mughal Sarai was approved by the World Bank in April 2014 and is also being implemented. The table below provides information on the three EDFC sections which are supported by the World Bank. The remaining 663 km of the EDFC is proposed to be funded by the Government of India and Public Private Partnerships.

World Bank Funded Eastern Dedicated Freight Corridor (EDFC)

Projects	Section	Length (km)	Number of Tracks	Cost (US$ million)
EDFC1	Khurja-Kanpur	343	Double	1,453
EDFC2	Kanpur-Mughal Sarai	393	Double	1,650
EDFC3	Ludhiana-Khurja-Dadri	397+43DL	Single	1,399
Total EDFC Program		**1,176**		**4,502**

The Government of India believes that the large investments being made in developing the EDFC will lead to large-scale job growth and overall economic development in the six corridor states. Based on an initial concept note prepared by the Ministry of Urban Development (MoUD), Government of India, the Department

of Economic Affairs (DEA) of the Ministry of Finance, Government of India requested the World Bank to provide non-lending technical assistance (NLTA) to prepare options for developments along the EDFC.

The initial work by the World Bank on the NLTA was directed and coordinated by the MoUD, Government of India. Subsequent work by the World Bank is being coordinated by the Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Government of India. The Uttar Pradesh state-specific work is being conducted in close collaboration with the Department of Infrastructure and Industries, Government of Uttar Pradesh.

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ABBREVIATIONS

AKIC	Amritsar-Kolkata Industrial Corridor
CONCOR	Container Corporation of India Ltd.
DIC	District Industrial Center
DIPP	Department of Industrial Policy and Promotion
EDFC	Eastern Dedicated Freight Corridor
EPI	Economic Potential Index
GDP	Gross Domestic Product
GoI	Government of India
GoUP	Government of Uttar Pradesh
ICD	Inland Container Depot
MoCI	Ministry of Commerce and Industry
MoMSME	Ministry of Micro, Small and Medium Enterprises
MSE-CDP	Micro and Small Enterprise – Cluster Development Program
NCR	National Capital Region
NIMZs	National Investment and Manufacturing Zones
NMCC	National Manufacturing Competitiveness Council
NOCs	Non Objection Certificates
PMCs	Project Management Consultants
SEZs	Special Economic Zones
SITP	Scheme for Integrated Textiles Parks
SMEs	Small and Medium Enterprises
UP	Uttar Pradesh
UPSIDC	Uttar Pradesh State Industrial Development Corporation

❖ An economic assessment of all 70 districts in Uttar Pradesh indicates that four sub-regions with 14 districts show promising economic potential for industrial estates and logistics hub development.

❖ This report is based on fundamental economic analysis that considers:
- Market accessibility
- Industrial diversity
- Commodity flow
- Per capita industrial investment
- Specialization in agriculture
- Social conditions

❖ Four promising sub-regions have been identified:
- Auraiya-Kanpur
- Ghaziabad-Gautam Buddha Nagar
- Aligarh-Hathras-Firozabad-Agra
- Allahabad-Varanasi

❖ Based on discussions with decision-makers in the Government of Uttar Pradesh and Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India and taking into consideration the World Bank's India Country Partnership Strategy, the options paper suggests proceeding with Auraiya-Kanpur sub-region and, at a later date, focusing on Allahabad-Varanasi.

❖ Careful, systematic and financially viable implementation will be needed.

The purpose of this report is to present a range of options for regional development in Uttar Pradesh (UP) by leveraging spatial development patterns along the Eastern Dedicated Freight Corridor (EDFC). The report reflects the Government of India (GoI)-World Bank's India Country Partnership Strategy that promotes balanced regional growth. While this work has important implications for economic development and job creation, the latter is being covered in a separate work by the World Bank. The EDFC which is also known as the Amritsar-Kolkata Industrial Corridor (AKIC) will soon traverse UP and generate significant opportunities for economic development in well-located and resource rich areas. Uttar Pradesh is the largest state in India in terms of population and has a diversified economy, ranging from agricultural to manufacturing to tertiary activities. It also has a large population living in poverty that would benefit from well-targeted and effectively implemented economic development projects.

The report focuses on identifying potential sub-regions for logistic hubs and industrial development in the UP districts and develops an Economic Potential Index (EPI) to assess the likely impacts of investments therein. Using this methodology, four sub-regions have been identified for economic development, namely: (i) Auraiya-Kanpur; (ii) Ghaziabad-Gautam Buddha Nagar; (iii) Aligarh-Hathras-Firozabad-Agra; and (iv) Allahabad-Varanasi. Based on discussions with decision-makers in the Government of UP (GoUP) and the Department of Industrial Policy and Promotion (DIPP), MoCI, GoI, and taking into consideration the World Bank's India Country Partnership Strategy, the options paper recommends that the GoUP proceed with Auraiya-Kanpur and, at a later date, focus on the Allahabad-Varanasi sub-region.

This report is part of a larger three-phased project to identify industrial and logistics hub development options along the EDFC/AKIC. In phase one, extensive data was collected on each of the six states through which the EDFC/AKIC traverse. The report represents the second phase of analysis, namely the focus on the districts of UP. Finally, in the third phase, in-depth assessments will be made of select sub-regions in UP, examining their economic structure and patterns of industrial clustering and assessing infrastructure, industrial and logistics hub requirements in these sub-regions.

The remainder of the report is divided into eight sections: (1) Introduction; (2) Overview of Uttar Pradesh; (3) Uttar Pradesh's Economy and Infrastructure: A Synopsis; (4) UP's District Economies and Economic Potential Index: Key Factors; (5) Criteria for Locating Logistics and Industrial Hubs within Promising Sub-Regions in UP; (6) Moving towards Implementation; (7) Conclusion; and (8) Annexes.

Section 1: Introduction describes the purpose of the report and outlines its structure.

Section 2: Overview reviews the demographic, poverty, urban, economic and spatial structure of UP.

Section 3: Provides a synopsis of economic and infrastructure trends in UP, reviewing development

trends and describing the state's economic set-up. This section also illustrates the diversity of economic structures across the state and describes its existing infrastructure and connectivity networks.

Section 4: Describes the development of the EPI model and reports the results of the economic analysis of UP's 70 districts. The section further describes the economic model developed for the options analysis and its main drivers (Annexes 1-5 provide detailed background material on the model, district level EPI scores and explanatory material). Based on the model, 14 districts concentrated in four sub-regions are identified as having promising development potential, namely Auraiya-Kanpur, Ghaziabad-Gautam Buddha Nagar, Aligarh-Hathras-Firozabad-Agra and Allahabad-Varanasi.

Section 5: Reviews the criteria for locating logistics hubs and industrial development. It lays out the groundwork for detailed studies of the selected sub-regions in phase three. The section reviews the key factors that should be used to select districts for logistics and industrial facility investment, namely growth potential, ability to generate spread-effects, improve market access, increase network density, ease of land assembly, fiscal capacity, and social and environmental impacts.

The penultimate section on 'Moving towards Implementation', outlines the next steps that should be taken in analytical work, reviews India's experience with developing industrial estates and offers suggestions for improving implementation, as elaborated in Annexes 6 and 7.

Finally, the report proposes a set of options for fostering development along the EDFC/AKIC and outlines the work proposed in phase three to support discussions between the GoUP, DIPP and the World Bank.

1. INTRODUCTION

A. Purpose and objectives

Uttar Pradesh is one of the most densely populated states in India with high rates of poverty. The state is a major contributor to the agricultural staples of the country and, at present, a large percentage of the state's labor force is engaged in low-productivity agricultural activities with the agricultural sector employing 60 percent of all formal workers at the state level (Census of India, 2011). With investments pending in rail and infrastructure, such as the EDFC, UP is evolving into the main economic growth corridor of North India. This evolution is timely since recent trends indicate that the structure of the state's economy is shifting to the industrial and service sectors. Based on past and continued urban growth and investments in regional transportation networks, this transformation is likely to continue. It is important that the state recognizes how these changes in economic structure, urbanization and connectivity provide a major opportunity to advance economic development, promote industrialization and eradicate poverty.

The purpose of this report is to provide the GoUP, GoI and the relevant state and local bodies with a district-wise examination to identify areas that would benefit from more intensive economic, infrastructure and connectivity research to determine the locations for investment in industrial estates and logistics hubs. International experience shows that improvements in accessibility lead to economic expansion and thus, with the EDFC, spread effects should result, with underdeveloped areas such as Auraiya and Allahabad becoming more attractive for investment.

This report is part of a three-phase examination of potential economic development along the EDFC. The first phase, completed in October 2013, compiled detailed socio-economic data for the six states through which the EDFC traverses (CRISIL, 2013). The second phase comprises the preparation of this report for UP and the third phase, to be completed in late 2014, will consist of two in-depth economic and infrastructure assessments of selected districts.

The report provides an overview of the UP economy, illustrating changes in its economic structure. It also provides information on trends in urbanization, population growth and economic productivity. With this background, the report presents the results of economic modeling to determine the best locations in the state to concentrate logistics hubs, industrial estates and infrastructure investments. The model is used to estimate the EPI, identify and rank the districts likely to benefit from investments in industrial estates and logistics hubs. The modeling approach assesses six characteristics in each district associated with variations in economic productivity, namely: (i) market accessibility; (ii) industrial diversity; (iii) commodity flow; (iv) per capita industrial investment; (v) agricultural specialization; and (vi) poor social conditions. The analysis in phase three will assess economic clustering and the availability of infrastructure and industrial facilities.

On the basis of this economic analysis, the report defines the sub-regions or geographical areas where sub-regional investments in logistics hubs, industrial estates and trunk infrastructure would have the greatest impact in promoting economic development and

enhanced productivity. Subject to a deeper analysis in phase three, these sub-regions would receive targeted public and private investments in logistics centers, industrial estates and critical trunk infrastructure.

In order to structure the phase three work, the report also outlines the criteria for targeting investments in the sub-regions. These criteria broadly focus on implementation and local government capacity to sustain development effort. The report also provides advice on creating logistics centers and industrial estates, as well as pointing out common implementation pitfalls.

B. Structure

Apart from the executive summary, the report has eight sections, namely: (1) Introduction; (2) Overview of Uttar Pradesh; (3) Uttar Pradesh's Economy and Infrastructure: A Synopsis; (4) UP's District Economies and Economic Potential Index: Key Factors; (5) Criteria for Locating Logistics and Industrial Hubs within Promising Sub-Regions in UP; (6) Moving towards Implementation; (7) Conclusion; and (8) Annexes. The next section provides an overview of UP.

With a population of almost 200 million in 2011, (Census of India, 2011), UP is India's largest state in terms of population. Although 78 percent of the state's population is classified as rural, UP has the second largest urban population of any Indian state at 44.5 million.

A. Population trends

Over the last decade, UP's annual population growth rate has averaged two percent, higher than the national average (Census of India, 2011). However, as Figure 1 illustrates, on a district by district basis, the growth is uneven. International experience reveals that population growth and migration tend to move to areas with economic opportunities.

Without investments in connectivity, logistics centers, industrial estates and other infrastructure, UP can expect population growth to remain higher in areas located in and around growing industrial districts such as in the west, near the National Capital Region (NCR), and in districts that have employment growth. Of the state's 70 districts, only 10 had population growth rates exceeding 2.5 percent per year between 2001 and 2011 namely, Bahraich, Bahrampur, Chitrakoot, Gautam Buddha Nagar, Ghaziabad, Kheri, Lucknow, Moradabad, Siddharthnagar and Sonbhadra. Three districts had an annual growth rate above 3.5 percent, that is Bahraich (4.6 percent), Gautam Buddha Nagar (3.7 percent) and Ghaziabad (4.2). The largest metropolitan area in the state, Kanpur Nagar, had a population growth rate of only one percent per year between 2001 and 2011.

FIGURE 1: Population growth rate in UP districts between 2001 and 2011
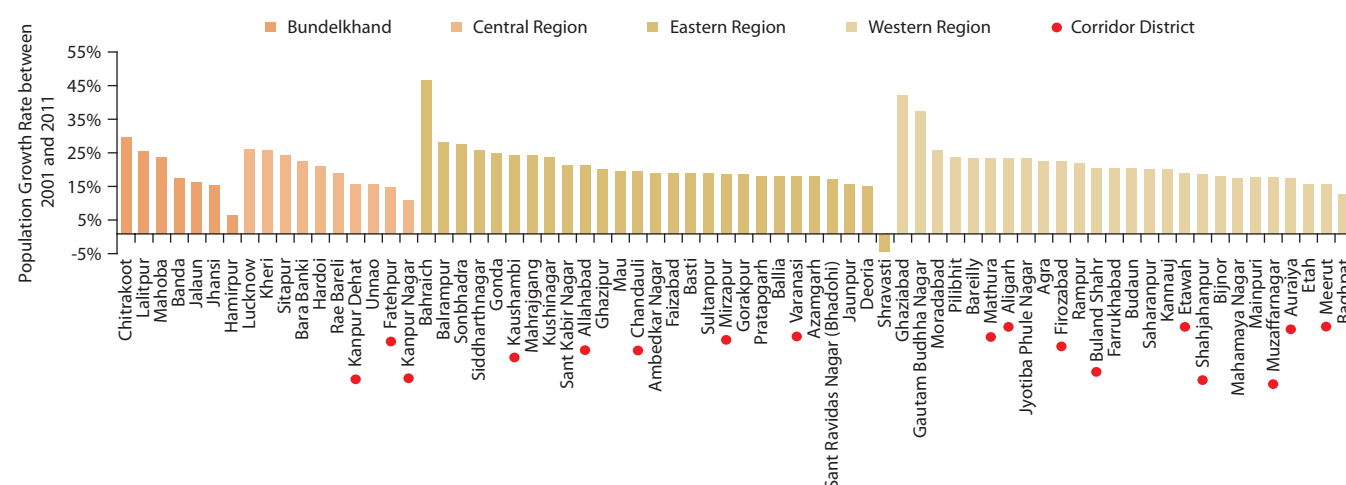

Source: Census of India, 2001 and 2011.

As Figure 2 illustrates, UP's poverty rates (headcount levels) are higher in the center and eastern third of the state. The districts closer to the NCR and its exurban developments have lower poverty rates. This suggests that efforts to promote economic development in the center and eastern portions of the state may be an effective method for poverty reduction.

Uttar Pradesh is one of the six lagging states in India with 44.5 percent of its population below the poverty line (US$1.25 per person), almost 10 percent higher than the national average. The World Bank has estimated that 33 percent of India lives below the poverty line measure of US$1.25 PPP. In sharp contrast to the western parts of UP, Bundelkhand and UP's eastern regions have the highest concentration of poverty with almost 50 percent of the population living on less than US$1.25 per day (Figure 2).

B. How urbanization impacts economic prosperity

Global comparisons show that urbanization is positively correlated with Gross Domestic Product (GDP) per capita. Figure 3 shows that this trend also occurs in UP as the districts with higher shares of urban population such as Kanpur, Lucknow, Gautam Buddha Nagar and Ghaziabad also have higher GDP per capita.

FIGURE 2: Poverty concentrated in eastern UP, 2010
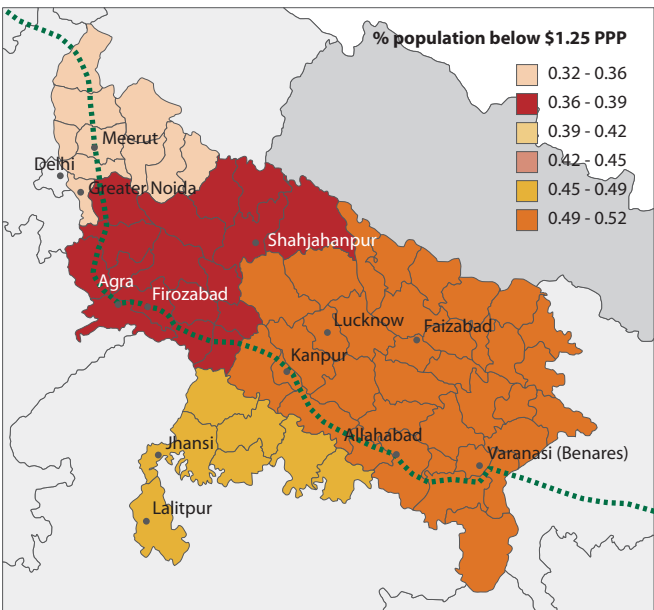
Source: World Bank staff calculations based on World Development Indicators, 2010.

International experience indicates a strong correlation between urbanization and economic productivity. The data for UP also reflects this relationship. Urbanization typically generates higher density economic activities, such as firms in the same industry tend to cluster together and create localization economies, which tend to make them more productive. This is due to the fact that firms can share factor inputs, draw larger pools of labor and exchange knowledge, a pattern illustrated in Figure 4 which shows that districts with

FIGURE 3: Urbanization and GDP per capita strongly related
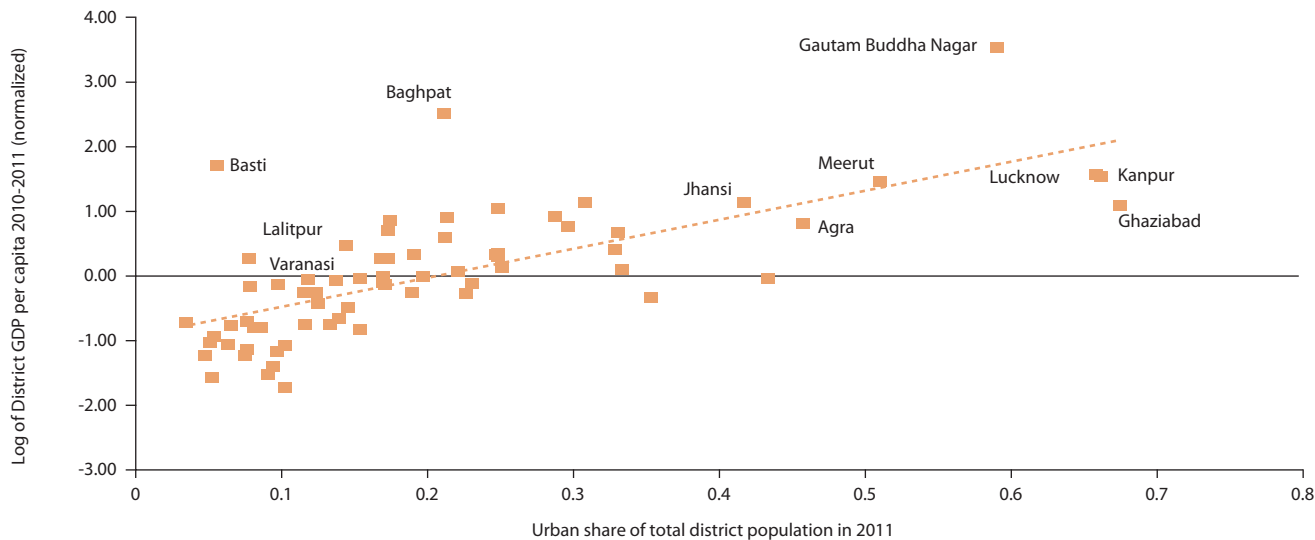
Source: World Bank staff calculations based on Census of India, 2011 and Directorate of Economics and Statistics, UP, 2010.

FIGURE 4: Spatial concentration of economic activity and higher incomes go together
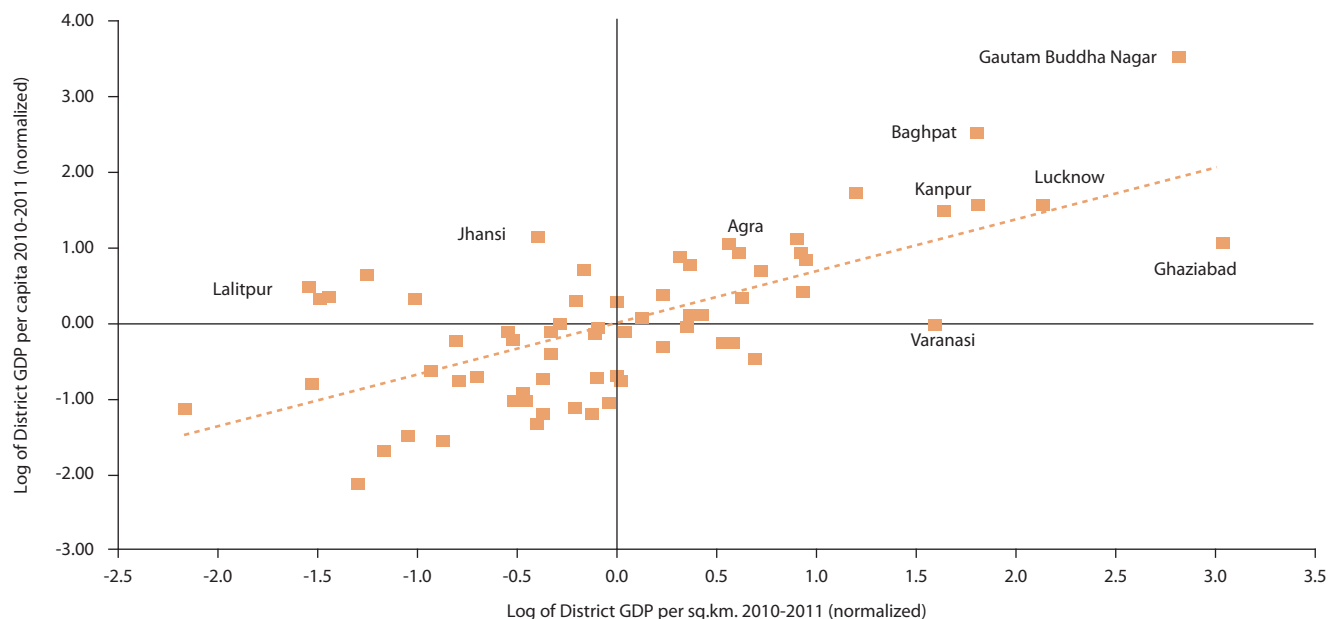
Source: World Bank staff calculations based on Census of India, 2011 and Directorate of Economics and Statistics, UP, 2010.

higher spatial concentration usually generate higher productivity as measured by GDP per capita.

As the relationship between spatial distribution of GDP per sq km with GDP per capita in Figure 4 shows, many cities in UP are undergoing transformation. Thus, a significant number of cities have above average district GDP per capita and above average district GDP per sq km (located in the upper right-hand quadrant of the graph). This indicates that infrastructure investments in strategic locations could potentially drive higher economic growth and better balance overall GDP per capita across UP, enhance connectivity and balance spatial competitiveness.

C. Key takeaways

Since UP is a large state with high variation in urbanization, poverty rates and demographic growth trends, its industrial development can play an important role in better balancing economic prosperity and well-being. The next section provides an overview of UP's evolving economic structure and discusses the state's current infrastructure endowments. This sets the basis for identifying strategic development options in UP and articulates the need for better connectivity and market access if the lagging districts are to develop.

This chapter reviews the district-wise economic development structure and spatial patterns in UP, based on UP state census data and data collected during the phase one field work.

A. Overview of the UP economy

The economy in UP is led by the tertiary or services sector which comprised 50 percent of the total district GDP amounting to Rs. 2,92,563 crore in 2011, at current prices (Directorate of Economics

FIGURE 5: Distribution of district GDP in the primary sector as a percentage of the state's total primary sector output, 2011

Source: Directorate of Economics and Statistics, UP, 2010-11.

and Statistics, UP). The second largest sector was the primary or agricultural sector at 29 percent, while the manufacturing or secondary sector contributed 22 percent of UP state GDP in 2011.

Uttar Pradesh is the largest producer of sugarcane and wheat, and the second largest producer of rice. The districts in western UP are the main producers of agriculture and related goods. Muzzafarnagar, Saharanpur, Bijnor and Bulandshahar were the four leading districts specializing in the agriculture and animal husbandry sub-sector in 2011. The location quotients for the agricultural sector in 2011 were 1.4 for Muzzafarnagar, 1.5 for Saharanpur, 1.2 for Bijnor, and 1.3 for Bulandshahar. In the central region, Lakhimpur Kheri, Bara Banki, and Sitapur were the other districts specializing in agriculture. Figure 5 illustrates the location of primary sector activities (agriculture) as a percentage of the state's total primary sector output.

Manufacturing activities contribute 22 percent of UP's GDP. This is the third largest sector and consists of registered and unregistered manufacturing, construction, and utility infrastructure. Even though this sector is not the primary driver of the state's economy, there are several districts with a high concentration of manufacturing activities. Gautam Buddha Nagar, Kanpur and Ghaziabad were the largest contributors to the state's district GDP in this sector. The location quotients for manufacturing in 2011 ranged from 2.5 for Gautam Buddha Nagar to 1.3 for Kanpur, 1.5 for Ghaziabad, and 1.3 for Allahabad. The registered manufacturing sub-sector comprised a large proportion of economic activity in Gautam Buddha Nagar, Ghaziabad, and Agra,

FIGURE 6: Distribution of district GDP in the manufacturing sector as a percentage of the state's total secondary sector output, 2011


Source: Directorate of Economics and Statistics, UP, 2010-11.

FIGURE 7: Distribution of district GDP in the tertiary sector as a percentage of the state's total tertiary sector output, 2011
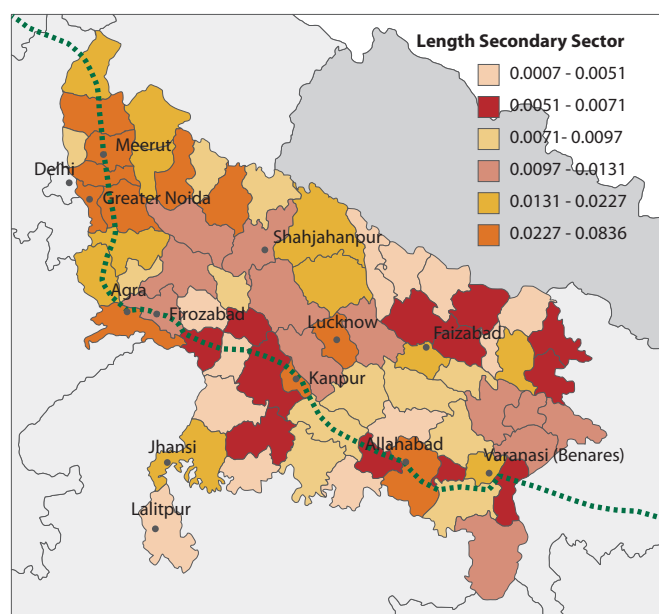
Source: Directorate of Economics and Statistics, UP, 2010-11.

while unregistered manufacturing was predominant in Allahabad. The construction sub-sector dominated the activity in Kanpur and Lucknow. Currently, most secondary sector activities are located along the planned regional freight corridor. Figure 6 shows the distribution of secondary (manufacturing) activities across UP in 2011 as a percentage of the state's total secondary sector output.

The largest sector, namely tertiary activities (services), which is composed of transportation, communication, railways, real estate, public administration, banking, and other services is the main driver of economic activity in UP. These activities are located in the main urban centers in the state, namely Kanpur, Lucknow, Allahabad, Ghaziabad, and Agra. In 2011, services sector location quotients ranged from 1.2 for Kanpur Nagar, 1.4 for Lucknow, 1.1 for Allahabad and 1.2 for Varanasi. Transport, communication, and trade were the main sub-sectors across all large cities, while public administration was concentrated in Lucknow, Kanpur, and Allahabad. Figure 7 shows the distribution of tertiary activities (services) across UP in 2011 as a percentage of the state's total tertiary sector output.

The GDP data for these three sectors shows that UP is already making the transition from agriculture to manufacturing to services, this being the global pattern of economic development. With increased connectivity and better market access, manufacturing has the potential to grow, while better accessibility and mobility for workers makes it easier for them to migrate to employment centers.

B. Infrastructure and connectivity in UP: Can the state foster networks of economic clusters?

The major cities in UP are connected by a regional network of railways and highways (Fig. 8 and Fig. 9). However, the network coverage is incomplete and congestion is highly problematic. While limited data is available on connectivity and more data will be gathered during the phase three studies, interviews with businesses in the Kanpur region of UP indicate a number of logistics challenges that firms face. First, there is no rail access from Kanpur to the Mundra port in Gujarat, even though there is rail access to Jawaharlal Nehru Port Trust (JNPT) in Maharashtra.

FIGURE 8: Regional rail transportation network
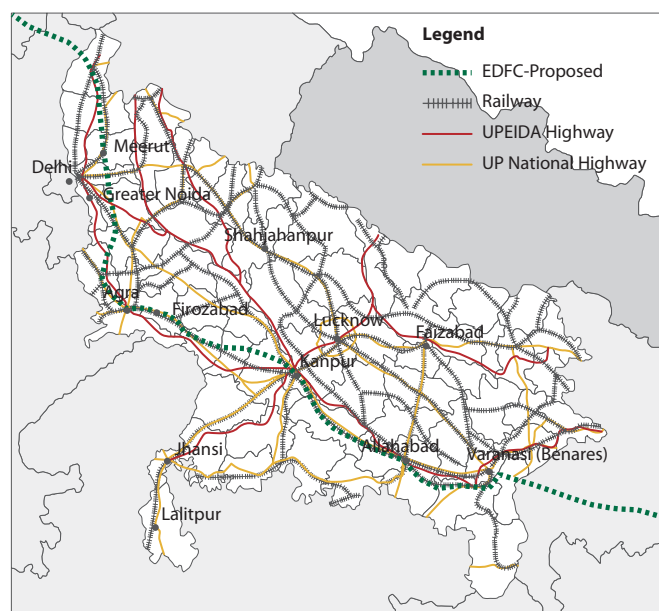
Source: UP Expressways Industrial Development Authority; State Atlas of UP, Survey of India.

FIGURE 9: Road density as ratio of length and area
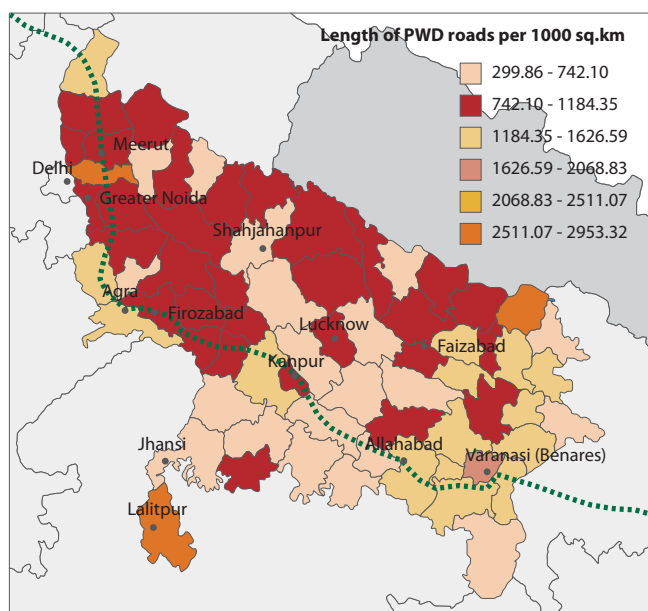
Source: World Bank staff calculations based on district-wise development indicators, UP, 2011.

The travel time to these ports ranges from six to nine days, and five to seven days respectively. Besides, Kanpur's only inland container port is located within the city in a highly congested area and is inadequate in terms of size and handling equipment. On the average, 77 percent of the containerized cargo is shipped by rail and 23 percent by road. This perverse trend is probably due to high levels of road congestion along the feeder and trunk highways. The respondents indicated that the alignment of the EDFC should either be shifted towards Odisha to facilitate goods movement eastwards or connector rail links added to provide connectivity between the existing and future industrial clusters and the EDFC.

Based on a study prepared by the National Manufacturing Competitiveness Council (NMCC), India's logistics costs are considerably higher than China, Canada, France and Japan. Power outages disrupt rail services. Moreover, port clearance time averages 3 days in India and 16 hours in China. These factors make doing business in India expensive and uncompetitive. Looking just at UP, its regional rail network and the level of development of local road infrastructure does not even stretch across the districts. The western and eastern regions of the state have relatively higher road density. However, districts with high shares of economic activity, namely Gautam Buddha Nagar, Agra, Kanpur Nagar, and Allahabad

have lower levels of local road infrastructure. Economic activities in these areas confront daunting congestion challenges to move goods by road. The phase three studies will collect more detailed data on congestion and connectivity challenges in select districts.

C. Key takeaways

This chapter reviews UP's three main economic sectors. Although they are spatially diversified, all three suffer from poor connectivity, by both road and rail. The key challenge to growing UP's manufacturing and services sectors is to increase connectivity and supporting infrastructure in areas where there are existing or emerging clusters of economic activity. The next section reports on the development of an EPI to identify promising sub-regions for investments in industrial estates and logistics hubs. The following section will then outline general options for strengthening clusters through infrastructure and facilities development. Together, the development of strategic investments in rail and road infrastructure, power and industrial and logistics facilities forms the core of the options that the UP government should consider. The phase three studies will assemble additional data and use it to determine how to best overcome congestion and poor connectivity challenges.

4. UP'S DISTRICT ECONOMIES AND ECONOMIC POTENTIAL INDEX: KEY FACTORS

A. Introduction

This chapter identifies several sub-regions, comprised of multiple districts, to locate growth centers in UP. In order to find the best locations, the attractiveness of districts as growth centers is evaluated, and sub-regions that warrant more in-depth analysis are identified. The analysis ranks the attractiveness of the districts as growth centers by determining the degree to which they possess key attributes that would enable them to achieve higher productivity and income if they were provided with better connectivity and infrastructure. The attractiveness of a district is also influenced by the EPI of adjacent districts. The EDFC not only provides UP districts with enormous opportunities for economic growth but also connectivity with other districts. Given these opportunities, this chapter evaluates the potential of UP districts, based on key factors, to become growth centers.

B. Key approach and EPI for UP districts

High potential locations are ranked by the extent to which the districts can capture services and maximize their growth potential. In order to evaluate the attractiveness of districts as growth centers and choose the best locations, this chapter describes and applies the EPI model. The EPI is constructed using two key district conditions: first, whether a district possesses key growth drivers, identified in Section (i) and, second, the state of the current and future transport network or transport network connectivity identified in Section (ii).

The methodological concept of the EPI is a gravity-type model that captures spatial interactions and potential for development (Rodrigue, 2013). A district's attractiveness level as a growth center is the weighted sum of the growth potential of the district, where the weights are inversely proportional to the impedance in reaching other districts also experiencing similar growth potential. An essential feature of the EPI is its estimation of a district's level of key growth drivers discounted by the network distance between districts.

First, each district is evaluated for its growth potential (the numerator of the EPI), which is the degree to which it possesses the key growth characteristics. Second, the growth potential for each district is adjusted by considering the district's transportation network distance (the denominator of the EPI) to other districts with growth potential. Therefore, if a district has high growth potential of its own and good transport network connectivity with other districts having high growth potential, the district's EPI score will be high.

In order to measure the growth potential for districts, six factors that are highly correlated with the district's economic growth are tabulated in Section (i). To measure the impedance of transportation network connectivity, network distances are presented in Section (ii).

The EPI is expressed as a gravity-type equation below:

$EPI_i = \sum_j (GD_j/ND_{ij})$ -------------- Eq (1), where

EPI_i = EPI of district i

GD_j = possession of growth drivers of district j (numerator)

ND_{ij}= transport network distance to district j from district i (denominator)

(i) Numerator: district's possession of key growth drivers (GD_j)

Evaluating the level of each district's key growth drivers requires two steps: first, identifying the key growth drivers or socioeconomic and policy factors that allow UP districts to increase their economic productivity; and, second, estimating an index to quantitatively calculate the degree to which a district possesses the key growth drivers identified in the first step.

In order to identify the major factors that drive the economic productivity of district economies in UP, a regression model is estimated (see Annex 1) to identify resources, capabilities, and policies of UP districts that have generated high per capita income. The results suggest six key growth drivers (Table A1 in Annex 1):

Positive to per capita income:

1. Market accessibility

2. Industrial diversity

3. Commodity flow

4. Per capita industrial investment

Negative to per capita income:

5. Share of rice production area (specialization in the agricultural sector)

6. Social conditions (unmet needs for family planning)

The values of these six key growth drivers for each district and the model (Annex 2) are used to calculate a weighted index to estimate each district's growth potential (GD_j). Annex 3 provides EPI scores for all UP districts.

(ii) Denominator: transport network distance between districts (ND_{ij})

When a district scores high on key growth drivers or is close to a district that also scores high on growth drivers, it has higher economic potential and is more attractive as a potential growth center. In other words, the distance between districts impedes the creation of high economic potential.

In order to estimate the network distance between districts, a network dataset was created by using current and future major transportation infrastructure networks in UP. The ArcGIS Network Analyst and geo-processing tools were used to prepare data, create the network dataset, and measure the network distance. The following measurement was made to assess the impedance of the transport network.

ND_{ij}

if i ≠ j: transportation network distance (km) between districts i and j

if i = j: 10 km (<minimum value of network distance between districts i and j)

C. Candidates for growth centers

According to the method described above, 21 districts, (Table 1), have at least a 0.5 standard deviation higher than the mean EPI value and can be regarded as preliminary candidates for potential growth centers. Figure 10 and Annex 3 order the EPI scores for all UP districts and Figure 11 maps all UP districts and defines high potential sub-regions.

These candidate districts are grouped into several sub-regional areas based on their proximity (see Fig. 11 and Table 2.) According to Table 2 and Figures A1, A2, and A3, among these districts, Kanpur Nagar and its surrounding region is clearly the most attractive area as a growth center location. In addition, the area's level of attractiveness is substantially higher than that of other districts or regions. Many districts located along the EDFC have very high EPI scores (see Fig. 11) but this may be due mainly to increased transportation connectivity arising out of the EDFC.

TABLE 1: High Economic Potential Index districts, 2014

EPI+
1. Kanpur Nagar (EPI = 2446)***
2. Unnao (2387)***
3. Ghaziabad (2338)**
4. Lucknow (2338)**
5. Hathras (2286)**
6. Kanpur Dehat (2286)**
7. Aligarh (2226)**
8. Kannauj (2209)**
9. Bulandshahar (2216)**
10. Gautam Buddha Nagar (2111)**
11. Bara Banki (2105)*
12. Firozabad (2083)*
13. Moradabad (2070)*
14. Meerut (2063)*
15. Sultanpur (2054)*
16. Etah (2017)*
17. Faizabad (2007)*
18. Mainpuri (2016)*
19. Farrukhabad (2013) *
20. Varanasi (2001)*
21. Allahabad (1996)*
22. Jyotiba Phule Nagar (1987)
23. Mathura (1978)
24. Etawah (1965)
25. Badaun (1960)
26. Auraiya (1953)

+ Bold: districts that have a 0.5 standard deviation higher than the mean
   EPI value.   (Mean EPI: 1858, Median EPI: 1873, Standard Deviation: 254)
*** above 2 standard deviations from mean
**above 1 standard deviation
* above 0.5 standard deviation.

On the basis of EPI scores, 14 districts, grouped into four sub-regions, were identified. Of these, the most attractive ones that can be considered as growth centers are Kanpur and its neighboring districts along the EDFC, such as Kanpur Dehat, Auraiya, and Unnao, referred to as the Auraiya-Kanpur sub-region.

The other regions that include EDFC districts with high EPI scores are Ghaziabad-Gautam Buddha Nagar, Aligarh-Hathras-Firozabad-Agra, and Allahabad-Varanasi. Of these, Ghaziabad-Gautam Buddha Nagar and Aligarh-Hathras-Firozabad-Agra, close to Delhi in the northern and western part of UP, are relatively remote from Kanpur while Varanasi-Allahabad is located in the southern and eastern part of UP, which is a relatively low-income region. Based on discussions with the GoUP and DIPP, GoI and taking cognizance of the World Bank's India Country Partnership Strategy, the report suggests that industrial and logistics hub development focus on sub-regions in the central and eastern areas of UP, namely Auraiya-Kanpur and Varanasi-Allahabad.

The focus can evolve over time. For example, industrial and logistics hub investments can initially concentrate on the Auraiya-Kanpur sub-region and then shift to other areas based on regional growth balance, poverty reduction, growth potential and required resources. Thus, to promote regional economic balance and equity, the Varanasi-Allahabad area could be considered as a potential location at a later stage. The other sub-regions, besides Auraiya-Kanpur, may also see their EPI levels increase if the Kanpur sub-region becomes successful and, therefore, move up in the rankings to warrant greater attention.

TABLE 2: Sub-regional classification of candidate districts, 2014*

Sub-region	Districts	Non-EDFC Districts close to each region
Auraiya-Kanpur Region	Kanpur (1), Unnao (2), Kanpur Dehat (6), (Auraiya (26))	Lucknow (4), Kannauj (8)
Ghaziabad-Gautam Buddha Nagar	Ghaziabad (3), Bulandshahar (9), Gautam Buddha Nagar (10), Meerut (14)	
Aligarh-Hathras-Firozabad-Agra	Hathras (5), Aligarh (6) Firozabad (12) Agra (28)	Etah (16)
Allahabad-Varanasi	Varanasi (20), Allahabad (21)	

*Rankings in brackets

**FIGURE 10:** Economic Performance Index Scores, 2014
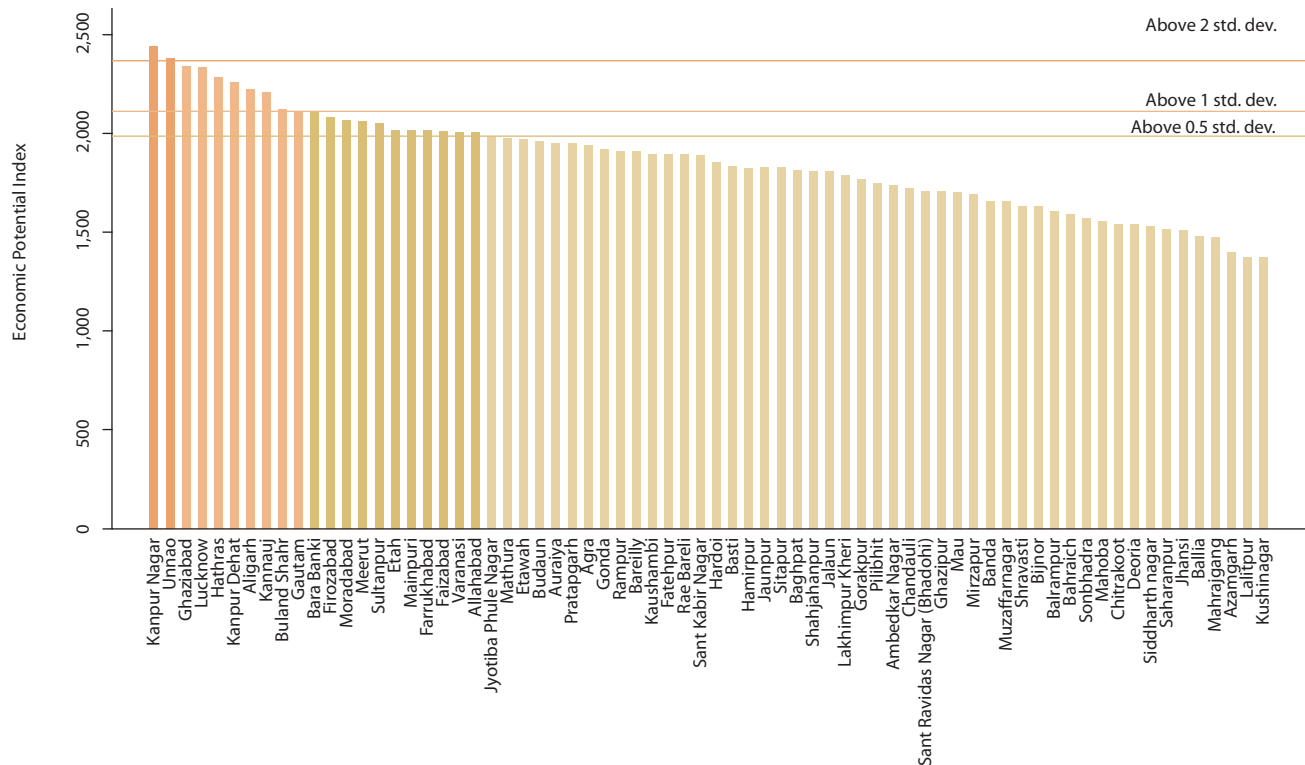
FIGURE 11: Economic Potential Index Map, 2014
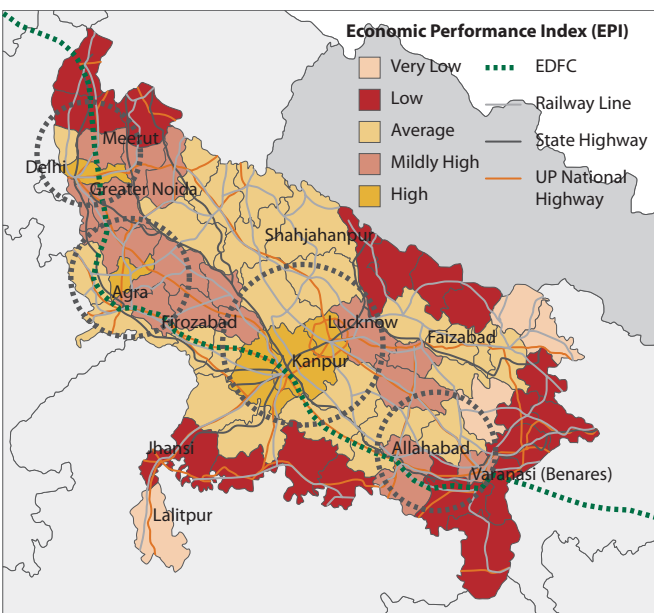
D. Major contributors to district EPI and policy implications

The models generated in this report have produced a series of important key determinants of potential growth (see Section B and Annexes 1 and 2). On the basis of the results, this section discusses some variables that have important policy implications.

A number of policy-related factors are crucial to improving a district's growth potential (see Figs. A1–A3 in Annex 4). In Figure A1, the variable of market accessibility is associated with the capacity to capture market potential and successfully utilize economies of agglomeration (see Annex 5 for district ID labels). Although a district's development strategy might not fully control market accessibility, an effective policy would be to manage urbanization, encourage the migration of highly skilled workers, and improve export and logistics capacity. Support to the efficient flow of goods and labor are essential for increasing a district's economic potential, represented by the move from the third (lower-left) to the first (top-right) quadrant (World Bank, 2009).

In Figures A2 and A3 of Annex 4, the variables related to industry investment and diversity are those on which a district could focus in order to increase its growth potential (industrial diversity is defined as diversity within non-agricultural sectors). As shown in

Figure A2, increasing per capita industrial investment is critical to strengthening a district's economic potential. Higher economic diversity will also increase growth potential (see Fig. A3). The transformation of a district's economy from one focused on the primary sector to a more diversified one, including secondary and tertiary industries, is likely to boost growth potential. This would also allow the district to obtain greater per capita investment. Such a transition would require policy efforts to connect related businesses and geographies. Ultimately, UP's districts should possess high value-added production activities concentrated in dense, interconnected urban clusters.

E. Conclusion

Using a series of analytical methods such as EPI, and discussing core policy and strategy critical for rapidly achieving higher levels of development, this chapter has identified the sub-regional locations that can become growth centers in UP. Thus, understanding these key growth drivers makes it possible to determine which districts have the greatest economic potential in UP.

The most attractive potential growth center consists of the clustered districts of Kanpur, Kanpur Dehat, Auraiya, and Unnao (Kanpur-Auraiya sub-region). In addition, to address poverty and underdevelopment in eastern UP, the GoUP should consider targeting Varanasi-Allahabad for industrial and connectivity investments at a later stage.

The report offers the following suggestions to the GoUP and DIPP policy-makers for facilitating growth centers in UP:

1. Design industrialization strategies to facilitate the transition to high value-added secondary and tertiary industries. Over time, a district should implement strategies to develop industrial specialization based on its core resources and capabilities. In the long term, a district should move to high value-added manufacturing and service industries, diversifying its industrial structure. Boosting investment in core and related industries to develop dense networks among connected firms to form economic clusters would help increase productivity.

2. Implement policies to support efficient commodity and logistics flow and to exploit market potential by investing in basic infrastructure and utilities and by improving connectivity to major urban agglomerations.

3. Invest to improve transport infrastructure and connectivity, especially for districts with high growth potential.

4. Make significant efforts to improve social and urban living conditions and reduce the poverty gap by eliminating crime and illiteracy and by investing in health care, childcare, and education.

A. Introduction

This chapter outlines more specific criteria for detailed economic and infrastructure assessments, to be carried out in phase three, for promising sub-regions identified using the EPI. These assessments will rely on thorough economic analysis and infrastructure assessments carried out in sub-regions. A discussion of this broader level analysis is presented in this section. The criteria, described below can be used to identify site development strategies for selected sub-regions, namely: (i) potential to catalyze broader economic impacts and synergies; (ii) ease of land assembly; (iii) local fiscal and governance capacity to implement projects; and (iv) minimum social and environmental impacts.

The following paragraphs discuss the four criteria that should be considered for selecting new industrial and logistics hub centers. Additional analysis during phase three will involve two consultants considering location factors.

(i) Potential to catalyze broader economic impacts and synergies

In addition to economic development in specific districts, this report also aims to select those districts that could catalyze economic benefit in surrounding districts as well. This will depend on how well a district targeted for logistics and industrial development creates spread effects, through connectivity with surrounding districts, including the availability of road and rail networks and the extent to which the surrounding districts cooperate with the core district receiving development assistance.

(ii) Ease of land assembly

The development of logistics hubs and industrial estates will require substantial land areas for the development of facilities. Therefore, as each potential district is evaluated, a review will also be made of land ownership patterns, parcel fragmentation and the overall ease of land acquisition for logistics and industrial facilities. Reserved land, and land owned by economically disadvantaged and indigenous groups will be carefully considered to minimize potential impacts. The aim is to identify sites that can with relative ease be acquired and serviced with infrastructure. These assessments will be made after narrowing down the range of eligible districts.

(iii) Local fiscal and governance capacity to implement projects

The development of logistics hubs and industrial estates is very expensive, requiring investment in buildings, infrastructure, roads and feeder rail lines. Districts with good potential for logistics and industrial estates development, in terms of economic promise, market access, spread effects and land assembly must also be able to mobilize the financial resources required for project development, including their own revenue sources and the capacity to leverage private sector funds. Once a smaller sub-set of districts

has been identified, their ability to finance logistics hubs and industrial estates will be gauged. Although not considered explicitly in this report, decision-makers should reflect on fiscal capacity during implementation.

(iv) Minimum social and environmental impacts

Each shortlisted site will finally be evaluated in terms of the social and environmental impacts resulting from the development of logistics hubs or industrial estates. Social impacts include land assembly issues and resettlement, while environmental impacts cover soil and water pollution, air quality, noise and other ambient factors.

B. Summary

The criteria outlined in this section will be used to guide the phase three analysis in selected sub-regions. Additionally, once the GoUP decides on the sub-regions for industrial and logistics investments these criteria can enable better targeting of investment as well as preparation of site development plans.

A. Next steps for moving forward

A range of districts in UP, having now been targeted for logistics hubs and industrial estates development, the GoUP might want to consider the following further steps:

- ❖ Detailed fieldwork on the cluster corridors.
- ❖ Market studies for facilities demand for each cluster corridor.
- ❖ Formulation of policy instruments for project development.
- ❖ Preparation of a detailed work program for project roll-out in two areas.
- ❖ Land acquisition, infrastructure planning and development.
- ❖ Detailed design plans for facilities at each site.
- ❖ Projected phasing of construction to align with the market.
- ❖ Implementation of the project.

B. What UP needs to do to enhance industrial development

Industrial zone programs have seen many challenges, in India and elsewhere, from which lessons can be drawn when the GoUP designs its own program around the EDFC, including regulatory changes (full discussion in Annex 6). Building the zones is a challenge but, even when built, demand has not

always followed, due largely to location selection, which should ideally match entrepreneurs' choices. The balance between agglomeration economies, congestion and factor costs, requires entrepreneurs to gravitate towards the largest or secondary cities with existing economic activity and capabilities in the sector, and not locations remotely placed vis-à-vis skilled labor and economic activity.

This is the logic of the EPI analysis, covered in the previous chapter, to determine where the greatest growth potential exists and, therefore, where the zone should ideally be situated. Conversely, if a location chosen for zone development has a low EPI, because of low access to skills, existing economic activity and demand, the risk of failure will be higher.

A strategy to reduce failure risk and maximize impact should therefore focus first on remedying the shortcomings of the selected location, using four priorities.

First, based on past experience, it is advisable to create a coordination council for the zone program and the EDFC to maximize the impact of planned feeder roads as well as rules and regulations for access to the corridor. These feeder roads should ideally link the location not just to the corridor, but also locations with high EPI, thereby remedying input, market and skill access issues. Special attention should also be given to factors that traditionally affect the reliability of the road sector in India, such as road check posts (World Bank, 2013).

Second, the state's regulatory changes to facilitate the development of private sector logistics parks should receive even higher priority, accompanied by active measures to support the financing of high-quality infrastructure. Private sector operators have triggered rapid modernization of practices since the liberalization of the Inland Container Depot (ICD) market in 2006, leading to strong growth of container traffic and enabling access to export markets. However this growth has been hampered by 'dual' policies, whereby state-owned corporations, notably Container Corporation of India Ltd. (CONCOR), nearly always got preferential treatments particularly for connectivity to the railways such as heavy subsidies for the construction of CONCOR's railheads (Ng and Gujar, 2009). Resolving such duality in providing connectivity will be especially critical for zones away from both the main railway access points and the main centers of activity.

One specific hurdle that should also be addressed on priority to facilitate the development of private logistics parks is the availability of customs officers. An analysis of activity and processes at the private logistics park in Kanpur revealed that, despite the park's apparent success, this was a clear constraint to growth. A mechanism for the state to provide customs officers depending on the level of activity, and reviewed at an agreed frequency, should be devised in consultation with the private sector.

Active support to the development of these private parks may take the form of a grant-supported program with implementation arrangements such as the Ministry of Textile, GoI Scheme for Integrated Textiles Parks (SITP), which has proved effective in getting high-quality industrial park infrastructure built and in attracting demand (Saleman and Jordan, 2013). This would mean allowing entrepreneurs, grouped in a Special Purpose Vehicle (SPV), to decide on the best location for the park and to buy the land. An added advantage would lie in spreading the benefits to such a group of Small and Medium Enterprises (SMEs), as opposed to a single, large entity. In turn, this would require financial and technical assistance in developing the required connectivity, since getting land close to railway lines is inherently difficult.

Third, implementation arrangements for the procurement of land should ensure that firms get a price advantage to compensate for the access and agglomeration issues. As noted earlier, a good price for land can justify setting up shop farther away from natural growth centers.

Specifying the resources for efficient use of land already owned by the GoUP is an important step in further reducing land acquisition requirements, as well as price pressures. This is relevant in UP as District Industrial Center (DIC) and Uttar Pradesh State Industrial Development Corporation (UPSIDC) data point to high rates of vacant industrial plots, as well as a significant portion of allocated land not being used, even in areas of high economic activity such as Kanpur or Unnao (CRISIL, 2013). Removing the hurdles and getting incentives to reclassify and reuse the land would also be critical, together with making information on land holdings easily accessible.

Fourth, a strong grievance redressal mechanism will boost effective implementation of industrial projects in such regions that are likely to have more context-specific hurdles than the more developed regions. This mechanism would therefore have to be centered on understanding issues from the private sector's point of view.

This report has analyzed the economic potential of UP's 70 districts, using the EPI methodology. Based on this assessment, four sub-regions consisting of 14 districts have been identified for further consideration and deeper analysis. These four sub-regions are likely to benefit from targeted investments in industrial estates and enhanced infrastructure services, particularly those that improve connectivity. The options paper also advises that the GoUP and DIPP, GoI focus further evaluation on two clusters, namely Auraiya-Kanpur and Allahabad-Varanasi. Of these, Auraiya-Kanpur is located in the center of UP and has very high EPI scores. However, although the Auraiya district does not score high on the EPI, with the development of Kanpur and surrounding districts, it will be drawn into the sub-regional development process and its economic potential will increase dramatically.

While other sub-regions score higher than Allahabad-Varanasi, UP's commitment to poverty alleviation and spatially balanced growth, as well as the World Bank's India Country Partnership Strategy, the report suggests that Allahabad-Varanasi sub-region can also be assessed for industrial estates and logistics hub development.

It is advisable to phase further assessments of these areas, starting first with Auraiya-Kanpur and then moving to Varanasi-Allahabad. To keep development options open, the World Bank has also included the Aligarh-Hathras-Firozabad-Agra region in the phase three work. Although this area is close to the NCR where the GoUP may not support public investment, an assessment of these three sub-regions in western, central and eastern UP, will enable better evaluation of development potential in leading and lagging regions. These suggestions should be integrated with the GoUP's overall industrial development strategy and development priorities.

To sharpen the analysis, better inform decision making and systematically assess the options, detailed economic cluster studies, strategic infrastructure and spatial planning assessments have been contracted for the Auraiya-Kanpur, Allahabad-Varanasi and Aligarh-Hathras-Firozabad-Agra sub-regions.

In light of ongoing work, it is proposed that the GoUP and the World Bank should:

❖ Discuss the results of the options paper to confirm that deeper analysis be conducted in the three proposed sub-regions.

❖ Develop an ongoing dialog to review development options in UP, particularly in regions adjacent to the EDFC.

❖ Define and agree on an implementation strategy, drawing on the experience of India's industrial development outlined in Annex 6.

CRISIL (2013) Data Collection for UP: PSD Policy, Profile of the Kanpur Region

Government of India (2013) 2011 Census of India, Agricultural Topics. Accessed January 27, 2014

Krugman, P., Fujita, M., and Venables, A. (1999) The Spatial Economy: Cities, Regions, and International Trade, Cambridge: MIT Press

Ng, A.K.Y. and Gujar, G.C. (2009) Government policies, efficiency and competitiveness: The case of dry ports in India, Transport Policy 16 (2009) 232–239

Rodrigue, J-P. (2013) The Geography of Transport Systems. New York: Routledge

Saleman, Y., and Jordan, L.S. (2013) The Implementation of Industrial Parks : Some lessons learned in India. Competitive Industries Global Practice, The World Bank

World Bank (2013) Doing Business Survey, Washington: DC: The World Bank

World Bank (2009) World Development Report 2009: Reshaping Economic Geography, Washington DC: The World Bank

World Bank (2013) India Country Partnership Strategy for the period FY13-FY17. Washington, DC: World Bank

In order to identify key growth drivers, an econometric model has been designed, namely the productivity determinant model structured on the linear OLS model.

$$PCI(i) = \sum b_i * X_i + e_i, \quad \text{where}$$

PCI (i) = time-averaged per capita income 2000–2011 for district i

X_i = determinant variables for per capita income

b_i = coefficient for determinant X_i

e_i = independent and identically distributed error term

TABLE A1: Log-linear OLS regression per capita income

Variable label	Coefficient (b)	t-statistics	P>t	Standardized coefficient (β)
Average market accessibility 00–05 (market potential)	0.051	3.300	0.002	0.342
Container inflow 06–07 (commodity flow)	0.011	1.860	0.067	0.135
Unmet needs for family planning 07–08 (social conditions)	-0.418	-4.710	0.000	-0.320
Share (%) of area under rice production (land use, industrial structure)	-0.003	-2.160	0.035	-0.149
% change in industrial diversity 06–11 (*2nd & 3rd industries only)	0.036	3.390	0.001	0.224
Per capita industrial investment	0.039	1.430	0.159	0.120
Sugarcane production per area (land productivity of agriculture)	0.260	1.510	0.136	0.099
GDP per area (density of economic activity)	0.035	0.600	0.549	0.060
Night light per area 1999/2001 (night light density, urbanization)	0.0001	0.180	0.859	0.012
School dropout rate (human capital)	-0.0001	0.000	0.997	0.000
Constant	8.397	11.280	0.000	

1. Number of observations = 70; F-Stat. = 27.9; adjusted R-square = 0.796.

2. For determinants: used log values of the variables except variables with % unit.

Key growth driver: Market accessibility, commodity flow, and logistics capacity

One crucial factor in the economic growth of UP is the capacity to access markets and material sources effectively. For example, a district's level of market accessibility, or the degree of market potential which a district can capture through its economic and industrial activities, is critical to its per capita income growth (see 'Market accessibility' in Table A1). Economically, a district functions not only as an industrial base that imports raw materials but also as a market through which final products are exported to other destinations. In general, proximity to densely populated and high-income agglomerations is associated with greater potential to reach markets at lower cost. This potential eventually can become a core resource for district economies, leading to their strong capacity to promote exports to other UP and non-UP districts. This market access-driven export capacity can eventually contribute to higher per capita income (Krugman, et al. 1999).

Commodity flow is also important in driving growth and can boost or weaken a district's market accessibility. In the case of UP, a district's capacity to support an efficient commodity flow positively influences its economic development (see 'inflow' in Table A1). In particular, the efficient inflow of coal and inflow and outflow of containers and petroleum are important. An efficient commodity flow requires a reliable transport infrastructure and sufficient logistics capacity. It allows a district to fully reap the benefits of its location economies and export capacity, which in turn encourages the migration of workers to the district.

Key growth driver: Industrial diversity and investment capacity

Among the major factors determining the per capita income level of UP's districts are their industrial characteristics, such as industrial diversity, specialization, and investment levels. In this regard, the industrial structure of a district economy is critical. In UP, the industrial and services sectors diversified more rapidly in high-income districts than those of low-income districts (see row '% change in industrial diversity' in Table A1).

Excessive focus by a district on agriculture does not positively influence the district's economic growth. In order to achieve higher income, a district first must carefully shift its land resources from intensive agricultural uses such as rice production to high value-added industrial activities, including secondary and tertiary industries (see '% of area under rice production' in Table A1). Even if land remains in use for an agricultural purpose, restructuring ownership in order to promote labor- and capital-productive methods of agriculture should be considered. For example, having too many landowners in a limited area depresses the per capita income of a district's economy, fragmenting agricultural production and making it difficult to achieve economies of scale.

In order to encourage conversion of land from agricultural to industrial uses, a district must mobilize capital investment to attract diverse, non-primary industries (see 'Per capita industrial investment' in Table A1). High-income districts have successfully secured investment in a range of manufacturing industries, including metals, chemicals, food, textiles, and machinery. As a result, these districts have more industrial zones, working factories, and employees per capita than low-income districts. In addition, high-income districts have seen the expansion of tertiary industries, including the trade, transport, communications, and real estate sectors, which generally generate greater added value.

Key growth driver: Social capital

A district's social attributes are critical to strengthening or weakening its capacity to stimulate development because they serve high levels of human capital. For example, widespread poverty, inadequate health care, unmet needs for family planning (see Table A1), and high levels of crime and illiteracy tend to make households unstable, lowering their labor productivity.

Std. $(\Sigma\ \beta*\mu T_j;\ \mu = 1$ if $\beta > 0$, $\mu = -1$ if $\beta < 0)$, where

Std. = standardized value (t-score)

β = weight or standardized coefficients of key driver variables higher than 1.2 and statistically significant at $p < 0.2$ from the model in Annex 1.

T_i = standardized t-score (mean = 50, std. =10) of district i's value for corresponding key drivers.

(Mean EPI = 1858)

Ranking	District	EPI	Ranking	District	EPI
1	Kanpur Nagar	2446.955609	36	Hardoi	1855.848004
2	Unnao	2387.235771	37	Basti	1836.955298
3	Ghaziabad	2338.974598	38	Hamirpur	1830.327123
4	Lucknow	2338.047311	39	Jaunpur	1828.066308
5	Hathras	2286.698316	40	Sitapur	1827.090555
6	Kanpur Dehat	2260.879018	41	Baghpat	1818.077625
7	Aligarh	2226.447373	42	Shahjahanpur	1811.671225
8	Kannauj	2209.979577	43	Jalaun	1809.609961
9	Bulandshahar	2126.316844	44	Lakhimpur Kheri	1787.277135
10	Gautam Buddha Nagar	2111.103603	45	Gorakhpur	1770.565535
11	Bara Banki	2105.374836	46	Pilibhit	1746.03025
12	Firozabad	2083.072681	47	Ambedkar Nagar	1739.869728
13	Moradabad	2070.960489	48	Chandauli	1727.665839
14	Meerut	2063.076859	49	Sant Ravi Das Nagar	1710.842461
15	Sultanpur	2054.840091	50	Ghazipur	1709.337656
16	Etah	2017.151035	51	Mau	1696.276648
17	Mainpuri	2016.001189	52	Mirzapur	1691.988047
18	Farrukhabad	2013.654407	53	Banda	1661.832149
19	Faizabad	2007.701865	54	Muzaffarnagar	1659.80173
20	Varanasi	2001.808185	55	Shravasti	1633.909572
21	Allahabad	1996.976664	56	Bijnor	1629.756898
22	Jyotiba Phule Nagar	1987.776837	57	Balrampur	1606.463291
23	Mathura	1978.997021	58	Bahraich	1589.354758
24	Etawah	1965.519776	59	Sonbhadra	1568.047309
25	Badaun	1960.763579	60	Mahoba	1557.796657
26	Auraiya	1953.739013	61	Chitrakoot	1544.986517
27	Pratapgarh	1948.344458	62	Deoria	1542.143015
28	Agra	1943.031106	63	Siddharth Nagar	1527.26726
29	Gonda	1923.40249	64	Saharanpur	1515.286657
30	Rampur	1909.953518	65	Jhansi	1506.76813
31	Bareilly	1909.748669	66	Ballia	1484.424435
32	Kaushambi	1898.703776	67	Maharajganj	1475.205243
33	Fatehpur	1894.747945	68	Azamgarh	1402.091029
34	Rae Bareli	1894.542995	69	Lalitpur	1372.505347
35	Sant Kabir Nagar	1890.788778	70	Kushinagar	1371.921674

FIGURE A1: Contribution of market accessibility to EPI
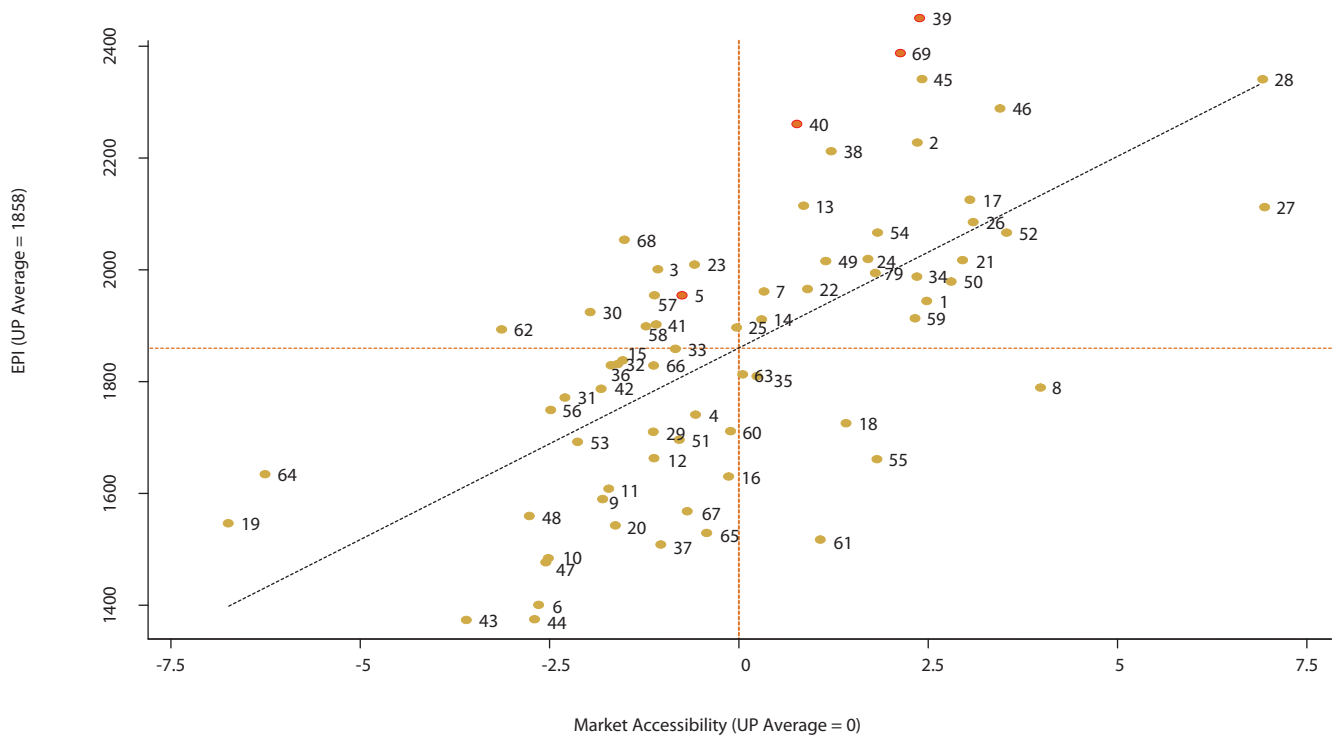
FIGURE A2: Contribution of per capita industrial investment to EPI
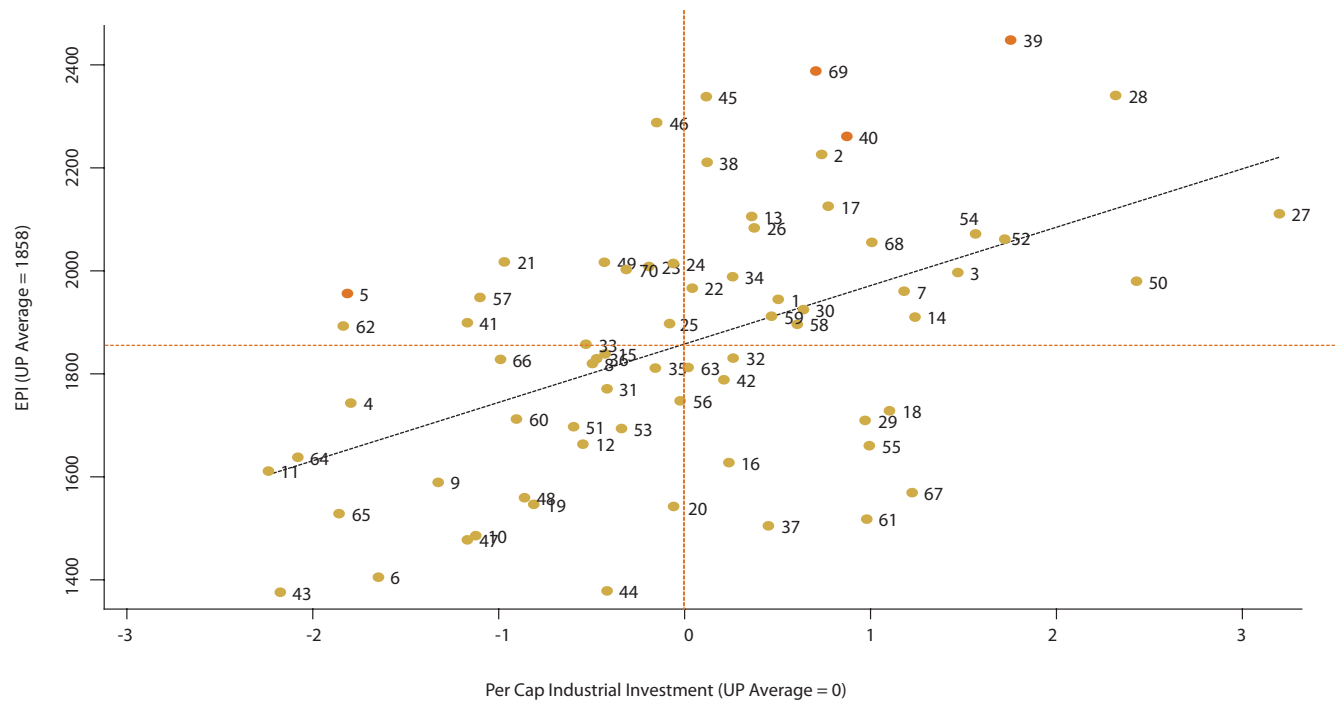
FIGURE A3: Contribution of industrial diversity to EPI

ID No.	District Name	ID No.	District Name
1	Agra	36	Jaunpur
2	Aligarh	37	Jhansi
3	Allahabad	38	Kannauj
4	Ambedkar Nagar	39	Kanpur
5	Auraiya	40	Kanpur Dehat
6	Azamgarh	41	Kaushambi
7	Badaun	42	Lakhimpur Kheri
8	Baghpat	43	Kushinagar
9	Bahraich	44	Lalitpur
10	Ballia	45	Lucknow
11	Balrampur	46	Hathras
12	Banda	47	Maharajganj
13	Bara Banki	48	Mahoba
14	Bareilly	49	Mainpuri
15	Basti	50	Mathura
16	Bijnor	51	Mau
17	Bulandshahar	52	Meerut
18	Chandauli	53	Mirzapur
19	Chitrakoot	54	Moradabad
20	Deoria	55	Muzaffarnagar
21	Etah	56	Pilibhit
22	Etawah	57	Pratapgarh
23	Faizabad	58	Rae Bareilli
24	Farrukhabad	59	Rampur
25	Fatehpur	60	Sant Ravi Das Nagar
26	Firozabad	61	Saharanpur
27	Gautam Buddha Nagar	62	Sant Kabir Nagar
28	Ghaziabad	63	Shahjahanpur
29	Ghazipur	64	Shravasti
30	Gonda	65	Siddharth Nagar
31	Gorakhpur	66	Sitapur
32	Hamirpur	67	Sonbhadra
33	Hardoi	68	Sultanpur
34	Jyotiba Phule Nagar	69	Unnao
35	Jalaun	70	Varanasi

Industrial zone development in India: Relevant experience for UP

Beyond location selection, there is a need to reflect on the instruments to be used by the GoUP, namely Investment Zones, Special Economic Zones (SEZs) and National Investment and Manufacturing Zones (NIMZs), which are essentially cluster development policies.

There are important lessons to be drawn from past experience with these instruments, which have been used extensively in India and elsewhere, with very mixed records. Active cluster development policies focused on infrastructure development "are often rightly criticized for producing white elephants; eroding the tax base; creating vehicles for land speculation; delivering hand-outs to favored firms; and funneling spending to favored districts. That is if the parks are even completed in less than a decade. More than one of these failures has afflicted industrial park schemes in India….Many of the most high-profile programs have….often delivered under-target, several years late and with low take-up" (Saleman and Jordan (2013).

The Indian SEZ program is the most significant of these examples, with major shortcomings that have been analyzed extensively. These include: (i) low levels of manufacturing activity; (ii) difficulty of land acquisition; (iii) dearth of infrastructure provision; and (iv) cost of the policy, which relies more on incentives than business climate reforms, and with little spillovers to the rest of the economy.

The recently introduced NIMZ policy, which the GoUP is planning to implement in Auraiya and Jhansi, is a major attempt to draw lessons from the SEZ Act and improve on it, though it is still largely untested. For example, the new policy emphasizes the use of land already owned by the government, thereby mitigating the challenges and controversies associated with land acquisition. It also focuses on the development of manufacturing, which is more likely to provide a large number of productive jobs that the country needs (IT accounts for two-thirds of the operational SEZs so far), while at the same time widening the scope to domestic production, away from the SEZs' exclusive focus on exports.

Nevertheless, another Indian cluster development policy has already been tested successfully. The Scheme for Integrated Textile Parks (SITP) of the Ministry of Textiles, GoI is a notable exception to the implementation challenge for zone and industrial park policies in India. The contrast is striking, in particular with the SEZ policy, which was launched around the same time (Table A6).

The SITP approach to implementation has been radically different from the traditional zone policies, in a manner that successfully got parks built and invested in. Most crucially, the government (at both center and state) has taken a hands-off approach and put the burden of location selection, land purchase and infrastructure implementation on the future users of the parks, grouped in an SPV. This has appealed to entrepreneurs, who often shy away from these policies for fear of being caught in bureaucratic delays, and have the choice of location most suitable to their businesses, a decision that only they can fully

TABLE A6: Comparisons between SITP and SEZ Act implementation

Metric	SEZ Act	SITP
Official start date	February 2006	July 2005
Number of projects formally approved by end 2011	580	40
Number of projects notified by end 2011	380	36
Conversion ratio 1: notified/approved	66%	90%
Operational projects by end 2011	124	24
Conversion ratio 2: operational/approved	21%	60%
Of which non-IT	44	24

Source: SEZ website (SEZs data), Ministry of Textiles, GoI (SITP data as of end 2011).

appreciate. This automatically resolved the question of demand for the parks once built.

On the other hand, the government has reinforced its capacity to monitor the development pattern induced by its policy, by focusing on the approval of project proposals and on the monitoring of project development. Crucially, this has relied on Project Management Consultants (PMCs) to support on-the-ground monitoring, mediate with entrepreneurs and provide them with the capacity to leverage government money for private financing.

Finally, the policy does not provide fiscal incentives but offers grants to resolve coordination failures for efficient implementation of the park projects. The size of the grants, critically, has incentivized the construction of parks of around 100 acres, large enough to create significant agglomeration economies, but small enough to allow private land purchase in most cases, without creating incentives for political interference, and to allow functional organization of the entrepreneurs. Two key additional features of the grant are flexibility in its use, with no micro-management of how much should be allocated to which part of the infrastructure, as well as the discipline in the way it is disbursed, in stages synchronized with private funds. This means entrepreneurs have both more incentives to participate and perform under the scheme.

The experience of industrial zones discussed in Annex 6 puts the use of zone policies in UP in perspective. The design and implementation arrangements of the newly designed industrial zones along the dedicated freight corridor should integrate the lessons from the past experience. A rigorous analysis of the SEZ experience and NIMZ features sheds light on some initiatives that should be explored by the GoUP to mitigate the most important zone implementation shortcomings, and help increase impact.[1]

Initiatives to ease the land location, sizing and acquisition issues

Procuring land appropriate for the industrial zone programs has been one of the most significant hurdles to their implementation. As noted earlier, the programs have relied on acquisitions of vast swathes of land by the states, creating delays and multiple controversies.

It is commendable that the GoUP is not set to buy all the land needed for the zones. It is the understanding that, instead, the GoUP would procure and acquire only 10% of that land, while the rest would be left to private promoters to procure and develop, following which the government would notify the area acquired. While this leveraging effect seems to have appealed in principle to private sector participants, they have

also expressed concern about actual implementation of such an arrangement. Also, a side effect of the government buying as well as issuing notification of such land could be an escalation of market prices in the surrounding areas.

Both concerns point to the need for a detailed implementation plan to be devised well in advance for this program, in consultation with the private sector while avoiding preferential treatment. Transparency in land availability and transaction prices would also reduce suspicion of favorable treatment and land speculation.

An important step in further reducing land acquisition requirements is to specify the means for more efficient use of land already owned by the government. This is relevant in UP as the DIC and UPSIDC data point to high rates of vacant industrial plots, as well as a significant portion of allocated land not being used, even in areas of high activity such as Kanpur or Unnao.[2] Removing hurdles and getting incentives to re-classify and re-use land would also be critical, and making information on land holdings easily accessible would be a useful complementary measure.

Even if the difficulties of state land acquisition and private sector procurement are resolved, location selection will remain a critical issue. As noted earlier,

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1   Jordan, L.S. et al. (2012), *Learning from SEZs,* Report written as part of Non–Lending Technical Assistance to the Planning Commission, GoI, on implementation of the manufacturing plan (unpublished).

2   CRISIL (2013), Report written on request from the World Bank (unpublished), pointing to 28% of plots not being allotted, and 36% of allotted plots not being utilized in existing industrial parks and areas developed by UPSIDC in the Kanpur and Unnao districts, respectively; though a degree of vacant plots is necessary to allow for expansion plans, excesses in these should be avoided so as to minimize land acquisition needs.

the previous zone programs have faced many failures not just in terms of getting the parks built, but also of attracting demand, of which location is a strong determinant. However, the analysis has voluntarily been made at the district level, without prescribing locations at a lower level. It has also stressed the importance of staying close to the nodes of latent comparative advantage.

This follows the observed pattern of entrepreneurs' location selection, when given the choice, as in the SITP scheme. Balancing agglomeration economies, congestion and factor costs, entrepreneurs either choose to establish themselves near the largest cities, or near secondary cities with existing activity and capabilities in the sector – very rarely deciding on locations remotely placed from skilled labor and activity.

This choice is best made by entrepreneurs themselves, which advocates giving them the freedom to set up industrial sub-zones or parks that are not necessarily contiguous (and therefore also smaller, which in turn reduces the land procurement hurdle), which could then be managed under the desired aggregate zone framework. There is an opportunity for the GoUP to explore this possibility of non-contiguity of land parcels with the NIMZ policy. Though it is not clear that the policy allows this, it does not appear to be specifically forbidden either and should be probed as the contiguity requirement has held back a number of SEZ projects and encouraged land grabbing for speculative purposes.

Finally, even if these concerns are successfully addressed, the process of land procurement will realistically remain prolonged. This would prevent the identification of hurdles further down the zone implementation process. Learning from and experimenting with brown field parks would be an efficient way to get around this issue. Examining the most critical hurdles to full implementation, healthy operation and further development for existing industrial parks, estates and zones in UP would enable identification of context-relevant implementation challenges. Selecting a small number of parks within the state, and then zoning them in varying ways, would help determine which regulations make a difference

to companies. Given that existing industrial parks will already have infrastructure in place, at least partially, experimentation can be done quickly, before zones requiring new construction come on line, allowing application of lessons learned.

Similarly, building a learning orientation in each newly created zone would help accelerate implementation for later ones, since these new zones are not likely to be developed at the same time. Starting with zones that encompass some of the existing parks and estates would help in the learning transition. These are also likely to be the areas where capabilities for industrial growth are most developed, further facilitating learning by focusing on less obvious hurdles.

Mechanisms for ongoing problem-solving and identification of state-wise regulatory reforms

Though mitigation of the land issue will remove a major implementation hurdle, there have always been many other, more specific, issues in the implementation of each project. When those are resolved, demand may not necessarily follow as the next hurdle could be the operating environment for firms within and outside the zones. This requires a built-in mechanism for problem-solving and to provide specific state-wise policy reforms that help attract demand for the zones and broaden their impact. Therefore, this mechanism should be centered on understanding issues from the private sector's point of view, since successful cluster development has almost always depended on an effective grievance redressal mechanism.[3]

By focusing on regulatory aspects that have best facilitated industrial growth, the redressal mechanism could be anchored to the zones, to help target problems across the state. This would raise investor confidence and enable linkages between the zones and the broader economy, as zone occupants could

3   Udyog Bandhu was initially set up by the GoUP's redressal mechanism, but the orientation seems to have changed recently, as exemplified by the tendering for consultant advice on land policy. However, the experience shared is meant as a general support to grievance redressal, whether through Udyog Bandhu or another structure.

source outside the zones to benefit from improved business conditions. The power sector is one such example, as a better balance between household and industrial tariff policy and flexibility in sourcing can significantly improve the situation, even at constant capacity.[4]

Most important of all, there should be confidence in the private sector that its voice will be heard, and personal favours not granted. The structure of the public-private dialogue platform will be critical in establishing a balance between private sector grievances and government views. This means a higher representation of the private sector but also, within the private sector, a good balance between business associations and individual entrepreneurs, and between smaller and larger ones. It also implies the existence of operating procedures and a decision structure that incentivizes information sharing and compromises, rather than the imposition of views from one side or the other. Particular attention should be given to whistleblower issues, where the obstructing behavior of local actors can be pointed out without fear of reprisal.

The resolution of such grievances will often be a precondition to taking advantage both of the new zone initiatives and the EDFC, based on primary data. For example, a significant number of firms in the existing parks and estates suffered from long timelines covering land allotment to the provision of Non Objection Certificates (NOCs) to start construction and operation.[5]

On the other hand, private sector participants have shown interest in both projects. In their interaction with GoUP, questions were asked about zone rules, factory shell provision and Floor Area Ratio (FAR) rules. Some improvements have also been suggested in labor management, to be applied state-wise. However, this dialogue will be productive only if it becomes a structured, systematic exchange ending

with an agreement on the measures to be taken, an implementation plan to apply these measures and the sharing of responsibilities in executing this plan. Such a process would have to be embedded in an effective grievance redressal mechanism.

Such a mechanism could also unveil specific issues facing certain industries in UP. For example, in Kanpur a structured dialogue on specific issues of pollution control in the textile and leather sectors could identify mechanisms for environmental protection while improving the ability of entrepreneurs to run their businesses. Thus, better communication on the use of existing policies to support environmental compliance (such as IIUS), and an understanding that authorizations would be promptly given following satisfactory completion of upgrades and passing of pollution standards would serve both goals.

Initiatives to create goodwill around the zone projects

Finally, goodwill needs to be created around the zone projects, including civil society and local stakeholders in the zones, or else they could face the same opposition and implementation hurdles as the SEZs and other zone programs. Land is again the most contentious issue. Apart from the points made earlier, the participating scheme for farmers selling their land, offered by some entrepreneurs and also mentioned by some state representatives, should be discussed with all stakeholders and the final details disseminated widely so as to create wide buy-in on the issue.

Not restricting regulation improvements to the zones, as in the case of power sector reforms is another important step towards creating a right environment for thriving industrial zones. Yet another step could be to use the zones as experiments and showcase best practice, as in the application of labor laws and the requirements for environmental practices. This could become an additional attraction for international investors or buyers, as in the textile sector global value chain (especially after the recent, tragic factory collapse in Bangladesh).

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4   CRISIL (2013) reported that many private sector stakeholders suggested that power supply be provided from the feeder rail lines of the EDFC, which was seen as an efficient way to reduce the power cut issue in the industrial areas. This stresses again how the EDFC needs to be leveraged by targeted, complementary policy measures in critical areas for industry's growth and competitiveness.

5   CRISIL (2013) cites estimates obtained from primary surveys spanning 4-5 years.

Checks and balances in the zone governance structure, by adding members from local, industry, and other stakeholder representatives apart from government officials would also facilitate acceptance of the special support within the wider community, who could then learn how to create linkages for spillover benefits. It would also add new perspectives and create healthy dialogue that lead to more effective outcomes. Ultimately, it would help mitigate the risk of capture, which is a significant risk to implementation and impact that requires measures beyond 'transparency' and online publication of project information.

Encouraging alternative, successful industrial park design and implementation arrangements

While these mechanisms and initiatives are being explored, policies using a bottom-up approach, such as SITP should be encouraged, as they are most likely to be implemented quickly, and could build confidence about the determination of the government to get things done – which in turn would help attracting demand for the larger zones. The first SITP project in UP was sanctioned in 2012, but implementation was not prompt, as in other projects. It is also worrying that this is one of the few parks that took a vertical integration approach to the textile value chain, which at this scale might be sub-optimal, and might signal the perception of a difficult business environment and underdeveloped supply chain infrastructure. Creating conditions for this project to succeed will attract more such projects, but only in so far as there is a perception that this was done through a state-wise improvement in the business environment and connectivity and not favored treatment.

Given UP's comparative advantage in the food and leather sectors, making the best use of the Mega Food Park Scheme and Mega Leather Park Scheme will be even more critical. Both schemes have replaced older, mildly successful versions to now function on principles largely borrowed from the SITP. However a close analysis reveals some variations in detail that

account for their slower rollout.[6] Finding ways to work around these constraints will be key to replicating the SITP's implementation success.

Most critically, flexibility will be required and negotiated with the GoI in the application of thresholds for allocation of grants to different components of the projects.[7] Micro-management by governments has been a major hurdle in effective and timely implementation of earlier policies. Similarly, the Micro and Small Enterprise – Cluster Development Program (MSE-CDP) of the Ministry of Micro, Small and Medium Enterprises (MoMSME), GoI will require the full collaboration of the GoUP, especially for land acquisition.

Leveraging zones with the EDFC: the crucial role of logistics, and policies and regulations to develop them

Zone development will also have to be closely coordinated with the EDFC, so that policy decisions such as location selection and zone rules are decided consistently and impact maximized. The creation of a coordination council would institutionalize the discussions and help navigate the hurdles around both programs which face risks commensurate with their large size.

Leveraging the zone program with the EDFC will also have to rely on the development of logistics infrastructure, both *soft* infrastructure, notably regulations around logistics, and *hard* infrastructure, notably last mile connectivity and logistics parks.

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6   The MFPS is closest to the SITP in its design, but only one project has received in-principle approval in UP (in Sultanpur) as of April 1, 2013, since 2010, according to the MoFP website, with final approval still pending on that date. The delay between in-principle and formal approval has been approximately one year for projects in other states. This might point again to broader, business environment issues that need to be solved for these schemes to perform fully, even if well designed.

7   The MFPS policy sets hard thresholds for allocation to 'core infrastructure', 'common facilities', R&D, etc. The complexity is re-inforced by size thresholds depending on the size of land for the project. The significant percentage of government assistance (70%) might be the motivation behind these 'safeguards', but this is likely to be counterproductive.

Recent research in India suggests that logistics is one of the key binding – and yet unrecognized–constraints to the growth of firms. In this context, the emergence of modern, private logistics parks can transform a firm's competitiveness and growth opportunities, especially if this enables efficient connectivity with the railways, thereby reducing the use of roads.[8] Thus, in UP, the establishment of a private logistics park in Kanpur in 2001 triggered a rapid modernization of practices, leading to strong growth of container traffic and enabling access to export markets.[9]

One specific hurdle that should be addressed on priority to facilitate the development of private logistics parks is the availability of customs officers. An analysis of activity and processes at the private logistics park in Kanpur revealed that this was a clear binding constraint to their growth.[10] Working out a mechanism by which the state can provide a number of customs officers depending on the level of activity, to be reviewed at an agreed frequency, should be discussed and devised in consultation with the private sector.

At the regulatory level, the growth of the private sector operators, allowed in the market since its liberalization in 2006, has been hampered by dual policies in dry port and logistics parks development. State-owned corporations, notably CONCOR, were nearly always given preferential treatment, through land pricing and distribution, policies on dry port operation (in particular, financial backing for loss-making public parks) and policies on dry port connectivity (for example, heavy subsidies for the construction of CONCOR's railheads).[11] That a private park could still develop in Kanpur and compete with the public one was due to specific factors, which makes it an exception rather than the rule.[12]

Even if these constraints are resolved, there is still a case for more active support to the development of logistics parks, given the significant needs of the GoUP (as compared to states in south India, which are well endowed with logistics parks), especially in less developed areas, and given the large capital requirements.[13] This assistance may take the form of a grant-supported program with implementation arrangements inspired by the SITP, allowing entrepreneurs, grouped in an SPV, to decide on the best location for the park and to buy the land.[14] In turn this would require financial and technical assistance in developing the required connectivity, since getting land close to railway lines is inherently difficult.

However, logistics efficiency will depend not just on the existence and development of logistics parks. Some general concerns will need to be examined, such as the stealing and mishandling issues consistently reported by private sector players. The dedication to freight should be an opportunity to ensure professionalization of infrastructure around the railway line.

Given the significant potential for selling goods more efficiently in the large domestic market (whether within the state, or in nearby, densely populated hubs in other states such as Delhi), policies will need to reduce restrictions in the movement of goods both within the state and with other states. Access rules to the EDFC along the railway should also be made flexible enough so that they do not restrain such trade.

Last mile connectivity is another pervasive issue in the private sector. This requires that enough feeder roads be built to link not only the new zones, but all industrial

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8   World Bank (2013): Joint report by the PREM and FPD teams of The World Bank to Dr. Raghuram Rajan, then Chief Economic Adviser to the GoI (unpublished).

9   LML, one of the largest industrial firms in Kanpur, was almost exclusively selling to the domestic market, for lack of reliable, timely access to ports. The private logistics parks enabled them to start exporting their products. In turn, this prevented their becoming bankrupt, and allowed them to invest in R&D to prepare for restarting domestic sales. Interestingly, the private park also seems to have triggered the growth of container traffic at the adjacent public logistics park, also linked to rails, but has put the much smaller public ICD, that uses only roads, almost out of business.

10   This is especially true as most firms (70% for the Kanpur ICD) choose 'factory stuffing' as a means of sending their goods, whereby goods are loaded on a container trail sent by the logistics park to the factory, and then sealed in the case of exports, as opposed to sending the goods through trucks for loading and sealing at the park.

11   Ng, A.K.Y. and Gujar, G.C. (2009): Government policies, efficiency and competitiveness: The case of dry ports in India; Transport Policy 16 (2009) 232–239.

12   What helped in particular was pre-existing ownership of adequate land in the vicinity of the railway line. The contrasting case of the much larger private logistics park in Khurja, which faces significant difficulties despite its strategic location, further illustrates this point.

13   Ng, A.K.Y. and Gujar, G.C., (2009).

14   An added advantage would be spreading the benefits to such a group of SMEs, as opposed to a single, large entity.

hubs, estates, parks and zones. Special truck routes, for example between Kanpur and Lucknow, should be considered as trade will increase significantly with improved road transport, even as the ratio of road to rail transport decreases.

Some further logistics issues could become known and ironed out through the grievance redressal mechanism. For instance, consultations with the private sector have shown that benefits to the food and food processing sectors from implementation of the EDFC could increase manifold if accompanied by the development of a proper cold chain, including refrigerated warehousing and transportation.

Cold chain development was the object of many attempts in India, but often failed. Lessons should be learnt about the cause of these failures, especially the incentives required to implement the scheme effectively and with the required output quality. In that sense, the MFPS seems a worthwhile option, as well as the existing cold chain scheme which has shown satisfying implementation results so far, according to government data.[15]

Other issues could similarly surface through this mechanism, such as the EDFC discussion with firms in the pets food and leather sectors, that might prevent industries from using railways, despite potential gains from increased selling capacity estimated at 20% to 30%.[16]

Conclusion

Zone policies have proved risky on multiple counts, in India as elsewhere, and this should be borne in mind by the GoUP when implementing their own. Alternatives do exist, however, and have been effective through innovative, bottom-up implementation arrangements.

Lessons from earlier experience should therefore be learnt, especially regarding land policies, but mechanisms should also be built to grapple with issues as they arise and use the new learning down the line to accelerate implementation. In the meantime, existing industrial parks and estates should be the preferred terrain for improvement, and industrial park policies that have been successfully implemented should be encouraged.

Coordination between the zone policies and the EDFC should also be a critical policy focus in order to maximize impact. However, this will entail providing the necessary support and conditions to develop the logistics infrastructure, especially private industrial parks. This will include not only policies that facilitate their establishment, but also more active support to their creation, through implementation arrangements that draw on the experience of the most successful Indian industrial cluster development policies.

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15 This stresses the need to resolve regulatory and capacity constraints in the power sector, already alluded to earlier, as 30% of cold chain operators' costs come from energy use, as well as integration of the local market to allow the set up of large, centralized cold chains, since heavy fixed capital costs in the sector entail large-scale economies.

16 CRISIL (2013) reports odor and spillage as such factors.

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