

Report No: ACS17034

# Republic of India

## Investment and Employment in Uttar Pradesh

### From Freight Corridor to Growth Corridor

March 2016

GSU12

SOUTH ASIA



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WORLD BANK GROUP



Korea  
**Green Growth**  
Partnership



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# ACKNOWLEDGEMENTS

This report has been prepared by The World Bank Group in response to a request from the Department of Economic Affairs (DEA) of the Ministry of Finance, Government of India (GoI) to provide Non-lending Technical Assistance (NLTA) to the Ministry of Urban Development (MoUD), GoI and the Department of Industrial Policy and Promotion (DIPP) of the Ministry of Commerce and Industry (MoCI), GoI towards the formulation of development options along the Amritsar-Kolkata Industrial Corridor (AKIC) (also known as the Eastern Dedicated Freight Corridor (EDFC)).

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This report has been compiled by the World Bank based on work done by m/s Deloitte Touche Tohmatsu India Private Limited on 'Detailed Regional Economic Analysis Study of Three Sub-Regional Growth Centers in Uttar Pradesh', and work done by m/s CRISIL Risk & Infrastructure Solutions (CRIS) Ltd. on 'Infrastructure and Investment Strategy for Three Sub-Regional Growth Centers in Uttar Pradesh'. The CRISIL team was led by Pratyush Prashant and included Mohan Sakhalkar, B. Balachandran, J. Padmanabhan, Anurag Mishra, Munishwar Vasudev, Subrata Sanyal, H A. Keshavamurthy, and Dr. Satyaprakash. The Deloitte team was led by Vishwas Udgirkar and included V. Padmanand, K. R. Shanmugam, Sudeep K. Sinha, Abhinav Sinha, Sumit Mishra, Darshit Shah, and Nayonika Dutta.

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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, 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 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)<sup>1</sup> 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 AKIC 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 AKIC sections which are supported by the World Bank. The remaining 663 km of the AKIC 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
<b>Total AKIC</b>		<b>1,176</b>		<b>4,502</b>

<sup>1</sup> The Eastern Dedicated Freight Corridor (EDFC) was recently renamed as the Amritsar-Kolkata Industrial Corridor (AKIC) by Government of India. As official project documents of the World Bank line of credit refer to EDFC, the Project titles have been retained as EDFC. This report otherwise refers to the corridor as AKIC.

The Government of India believes that the large investments being made in developing the AKIC 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 AKIC.

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
CETP	Common Effluent Treatment Plan
DIPP	Department of Industrial Policy and Promotion
GDDP	Gross District Domestic Product
GSDP	Gross State Domestic Product
GoI	Government of India
GoUP	Government of Uttar Pradesh
ICD	Inland Container Depot
NHAI	National Highways Authority of India
PPP	Public-Private Partnership
ROB	Rail Over Bridge
UP	Uttar Pradesh
UPSIDC	Uttar Pradesh State Industrial Development Corporation
VGF	Viability Gap Fund



# EXECUTIVE SUMMARY

This report is the third of a series of World Bank technical assistance aimed at identifying investment options that leverage the development of Amritsar-Kolkata Industrial Corridor (AKIC). The first phase, completed in October 2013, compiled detailed socio-economic data for the six states through which the Corridor traverses. The second phase focused specifically on the state of Uttar Pradesh (UP) – where more than 50% of the AKIC is expected to pass through – to identify potential sub-regions where industrial growth centers can be further developed. At the conclusion of the second phase, three sub-regional growth centers in UP – Kanpur-Auraiya, Agra-Aligarh, and Allahabad-Varanasi – were identified as having the greatest potential to become industrial and logistics hubs along the AKIC. This report aims to support the Government of Uttar Pradesh (GoUP) in identifying promising industrial clusters within the selected sub-regions that can be targeted for infrastructure, industrial and logistics investments in order to catalyze economic development in these regions as well as the rest of the state<sup>2</sup>.

An examination of the socio-economic profile of the three sub-regions reveals that these sub-regions collectively contribute a large share to UP's economy and industrial output, signifying their importance to the overall economic development of UP. Among the three sub-regions, the contribution of Kanpur-Auraiya is regarded as the most significant. Low development

outcomes in terms of physical and social infrastructure access, however, poses a challenge to improving industrial performance of all three sub-regions. Investments would need to be targeted to support the most promising industrial clusters in these areas to catalyze UP's industrial development in light of the AKIC. Based on their employment and investment generating potential, eleven (11) district-level groups of inter-related industries or clusters emerged as important contributors to the industrial landscape of the sub-regions:

- ❖ *Kanpur-Auraiya Clusters:* Leather & Leather Products (Kanpur & Unnao), Plastic Packaging (Kanpur), Chikankari (Lucknow), Perfume and Fragrance (Kannauj), and Hosiery (Kanpur).
- ❖ *Agra-Aligarh Clusters:* Leather & Leather Footwear (Agra), Foundry & Light Engineering (Agra), Glass Ware (Firozabad), Locks, Building Hardware, Fabrication, Light Engineering (Aligarh), and Food Processing - Flour, Dairy and Meat Cluster (Aligarh).
- ❖ *Allahabad-Varanasi Clusters:* Silk (Brocade, weaving, dyeing, etc.) (Varanasi).

These selected clusters were further analyzed in detail to determine their economic linkages based on key parameters such as demand conditions, inputs to industry, physical infrastructure, cluster software, policy and regulations, and the impact of upcoming infrastructure developments such as the AKIC. The analysis identified a number of infrastructure and software constraints that impinge on their

<sup>2</sup> The soft side intervention to enhance the overall industrial competitiveness and institutional capacity is being addressed by a separate stand-alone technical assistance by the World Bank and this note focuses on key infrastructure investment.

competitiveness and growth. The poor quality of roads and unreliable supply of power in the sub-regions emerged as top impediments for the industrial clusters and one of the major reasons why many of the industrial estates are underutilized. Common facilities are also lacking and software infrastructure (e.g. skills development, support for establishing industry associations, capacity building programs, etc.) need to be strengthened especially for smaller clusters.

To address these impediments and meet future requirements of industrial clusters in the three sub-regions, an infrastructure strategy was proposed with the following components or interventions: (i) augmenting infrastructure in existing industrial areas, (ii) developing new industrial parks and (iii) developing common infrastructure at the sub-regional level. Key investments for each component of the strategy were identified based on principles of promoting industry and regional integration, seamless connectivity, environmental sustainability and improving the quality of life of the industrial workforce.

A total investment of Rs. 7300 crore (US\$1170 million) excluding the cost of land) is estimated to be required for the development of industrial infrastructure for the three sub-regions. Ensuring successful implementation of the proposed investment strategy would entail a mix of resources, including those that can be mobilized by the private sector (equity and debt). Funding the investment requirement would involve tapping (i) Government of India (GoI) financial assistance schemes targeted to support the industrial sector and public-private partnership (PPP) projects, (ii) incentives and subsidies from GoUP under its

Infrastructure and Industrial Investment Policy 2012, and (iii) private sector financing via PPPs.

As a final note, the report suggests that the implementation of the strategy can be undertaken within 10 years by implementing investment priorities in the following order:

1. Provision of software assistance to industrial clusters to address current gaps in skills and institutions.
2. Expansion and upgrade of existing industrial areas with the condition that underutilized areas are better utilized before new infrastructure is created.
3. Piloting the development of new industrial areas (including provision for infrastructure and software assistance) that have already been planned for development and for which Uttar Pradesh State Industrial Development Corporation (UPSIDC) already secured land.
4. Development of common infrastructure that impact overall productivity of the sub-regions.
5. Development of new industrial infrastructure that would be required in the medium to long term to foster the growth of clusters.

By implementing the investment priorities in the suggested hierarchy, GoUP could lay the groundwork for obtaining results in the near term while building the foundation for longer-term industrial growth.

# 1. INTRODUCTION

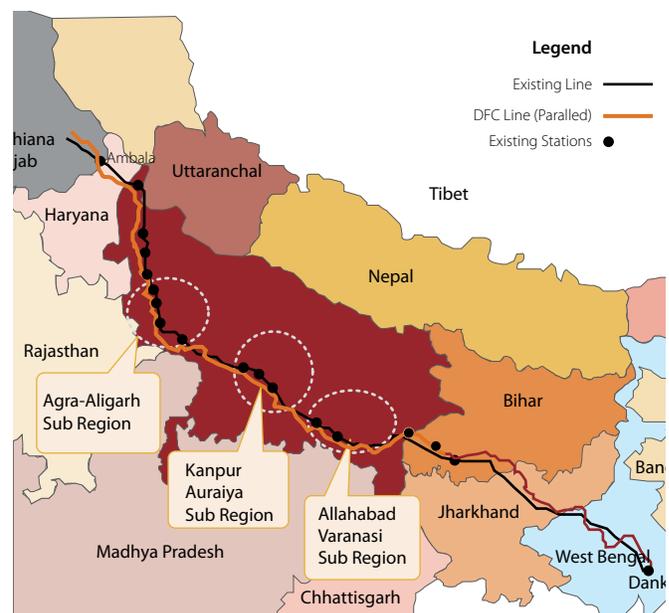
## A. Purpose and Objectives

Over 50% of the Amristar-Kolkata Industrial Corridor (AKIC), earlier known as the Eastern Dedicated Freight Corridor or EDFC, is envisaged to pass through the state of Uttar Pradesh (UP). This corridor is expected to improve accessibility to industries and will support the further evolution of UP's economic structure from mainly agrarian towards a more prominent industrial and service sectors. Its development also offers significant opportunities to promote economic growth and alleviate poverty in India's most populous state.

This report is the third of a series of World Bank technical assistance aimed at informing policy and investment decisions that leverage AKIC's development potential. The first phase, completed in October 2013, compiled detailed socio-economic data for the six states through which the Corridor traverses. The second phase focused specifically on UP to identify potential sub-regions where industrial growth centers can be further developed. Based on the results of the second phase work and discussions with the Government of UP and the Government of India's (GoI) Department of Industrial Policy and Promotion, three sub-regions (refer Figure 1) were identified as having the highest potential to promote economic development and enhance industrial productivity:

- ❖ Agra-Aligarh (comprising of the districts of Agra, Aligarh, Etah, Hathras, & Firozabad).
- ❖ Kanpur-Auraiya (comprising of the districts of Kanpur Nagar, Kannauj, Auraiya, Kanpur Dehat, Lucknow & Unnao).

**FIGURE 1:** The AKIC, UP and the three sub-regions



- ❖ Allahabad-Varanasi (comprising of districts Allahabad and Varansi).

This report aims to identify promising industrial clusters within the districts of selected sub-regions that can be further developed, as well as their corresponding infrastructure, industrial and logistics hub requirements to support their growth. The report then recommends an infrastructure investment strategy to meet industrial cluster infrastructure needs and identifies potential sources of financing to support the strategy's implementation.

## B. Structure

The report is structured as follows: The first chapter of the report (this chapter) presents an introduction and background of the report while Chapter 2 provides an overview of the contribution of the sub-regions to the economy of UP and their socio-economic profile. An analysis of the industrial clusters in the three sub-regions is discussed in Chapter 3 where promising clusters were identified and further assessed in terms of its prospects and economic linkages between firms within clusters or sub-clusters. On the basis of the linkages assessment, Chapter 3 also details the impediments and likely impact of addressing these on the growth of the clusters. Building on the impediments analysis, Chapter 4 presents an infrastructure investment strategy to address the current and future requirements of the industrial clusters. The subsequent chapters assessed different financing options (Chapter 5) and recommends implementation priorities (Chapter 6).

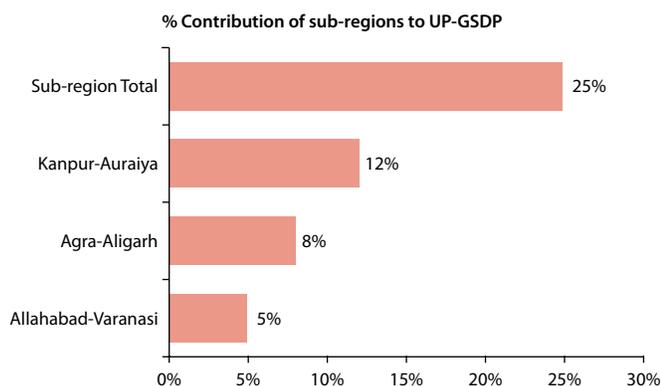
## 2. THE THREE SUB-REGIONAL GROWTH CENTERS OF UTTAR PRADESH

Three sub-regional growth centers – Kanpur-Auraiya, Agra-Aligarh, and Allahabad-Varanasi – in UP have the potential to be further developed as industrial and logistics hubs along the AKIC. Additional investments in these sub-regions have the potential to catalyze economic development not only within their industrial districts but also the rest of UP. This chapter provides an overview of the socio-economic and industrial profile of the three sub-regions.

### A. Contribution to Uttar Pradesh's Economy and Industrial Output

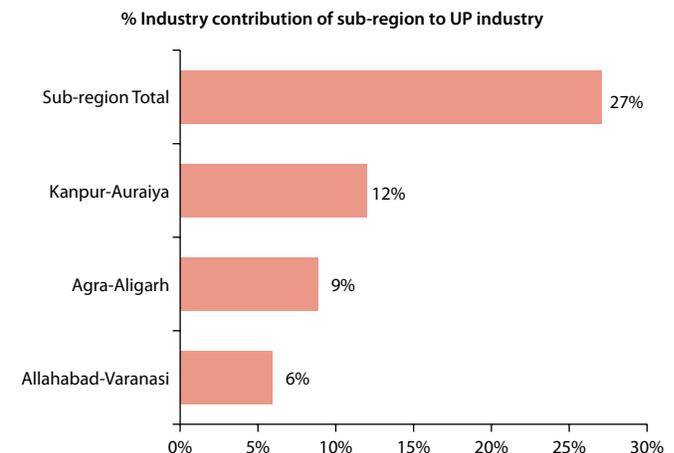
The three sub-regions together contribute around one-fourth of total Gross State Domestic Product (GSDP) of UP (see Figure 2). Kanpur-Auraiya accounts for around 12% of the total state GSDP while Agra-Aligarh and Allahabad-Varanasi contributes around 8% and 5% respectively. The sub-regions' combined

**FIGURE 2:** % Contribution of sub-regions to GSDP



Source: ASI, 2011

**FIGURE 3:** % Industry contribution of sub-regions to UP-GSDP



Source: ASI, 2011

Gross District Domestic Product (GDDP) grew at around 8% from 2005-2011 (compounded annual growth rate or CAGR), marginally higher than that of Uttar Pradesh (7.3%). Among the sub-regions, Agra-Aligarh has grown at a lower rate (6.3%).

The industrial sector of the three sub-regions contributes around 27% to the total industrial output of UP (refer Figure 3). Kanpur-Auraiya alone contributes around 12% to the total industry output of the state while Agra-Aligarh and Allahabad-Varanasi contribute 9% and 6% respectively. Amongst the three sub-regions, industrial growth in Kanpur-Auraiya has been the highest (CAGR of 8%) while the industrial sector of the other two sub-regions have grown at almost the same pace (7%) as that of that of UP (7.3%).

These trends signify the emergence of these sub-regions as important contributors to UP's economy and industrial growth. Among the three sub-regions, the contribution of Kanpur-Auraiya sub-region is regarded as the most significant, implying that its development will be crucial to the overall economic development of the state.

## B. Industrial Performance and Distinct Industries

The performance of industries in the three sub-regions underpins the growth of their respective economies. A cursory analysis of the performance of the industries in terms of investment, employment and the number industrial units located in these areas reveals (see Figure 4 for reference):

- ❖ Leather products, hosiery and garments, food products and metal products emerged are high potential industries. These industries have attracted high levels of investments, generated relatively higher levels of

employment and also have larger number of functioning industrial units.

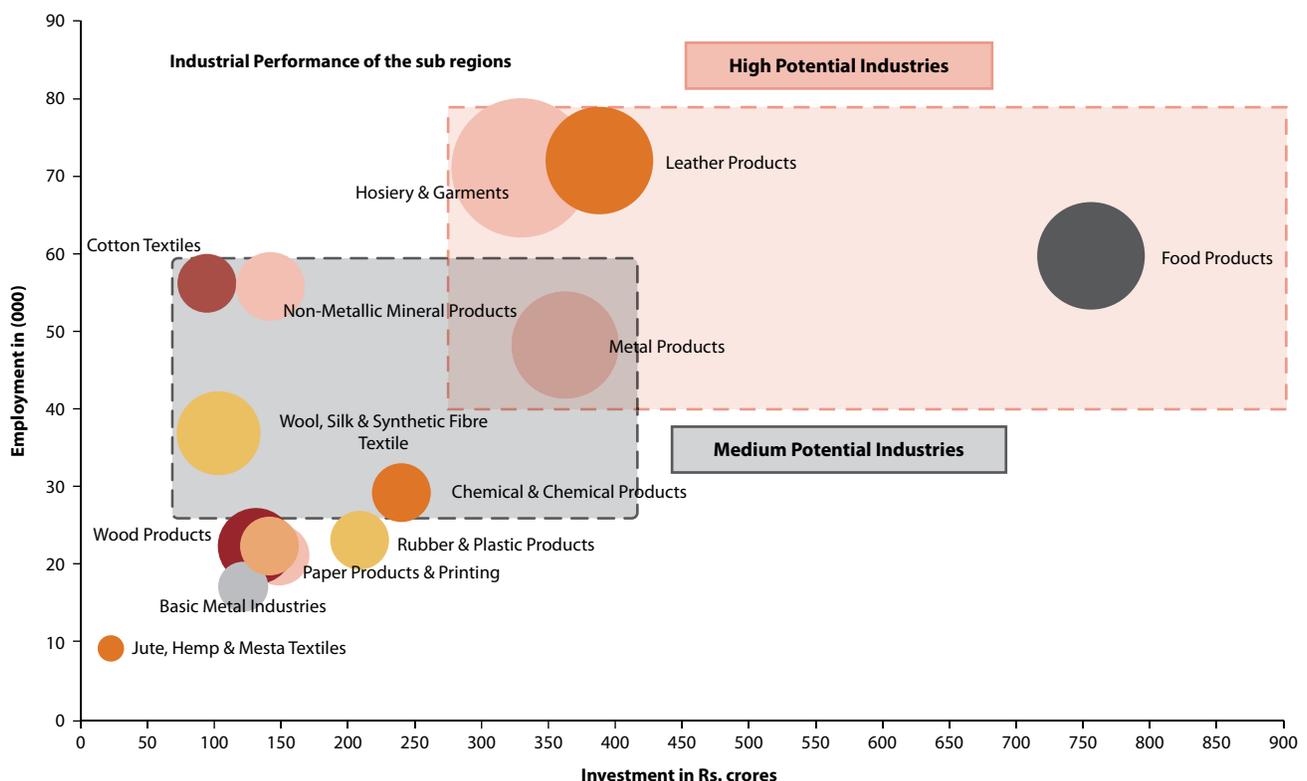
- ❖ Industries of medium potential generate low levels of investment and contribute moderately in terms of employment and have a relatively lower number of industrial units in operation. Industries under this category include cotton textiles, nonmetallic mineral products, wool, silk and synthetic fibers and chemical and chemical products.

It should be noted that though industries having low levels of investment and employment (left end corner of Figure 4) are considered minor industries vis-à-vis industries in all three regions, they may be regarded as significant in their own sub-region.

## C. Socio-Economic Profile

Socio-economic indicators provide an important context on the environment in which the industries in the sub-regions operate. For example, low levels

**FIGURE 4:** Industrial performance of the sub-regions



\*Size of the bubble represents Turnover in INR Cr.

of literacy or low participation of women in the industrial workforce of a region impedes the growth of industries in terms of low skill development, limited use of modern technology and inability to access credit facilities. This chapter discusses the key socio-economic features of the sub-regions and their potential impact on industrial performance.

1. **Per Capita GDDP:** The per capita GDDP for all the three sub-regions and UP's GSDP are relatively low when compared with the rest of India (Figure 5). This amplifies the strategic importance of industrial growth of these areas in lifting per capita incomes. Supporting the development of manufacturing industries in these regions will be vital to creating income-generating activities.
2. **Physical Infrastructure:** Observations on per capita electricity consumption, availability of *pucca* road per lakh population as well as access to water and sanitation services in the three sub-regions are discussed below:

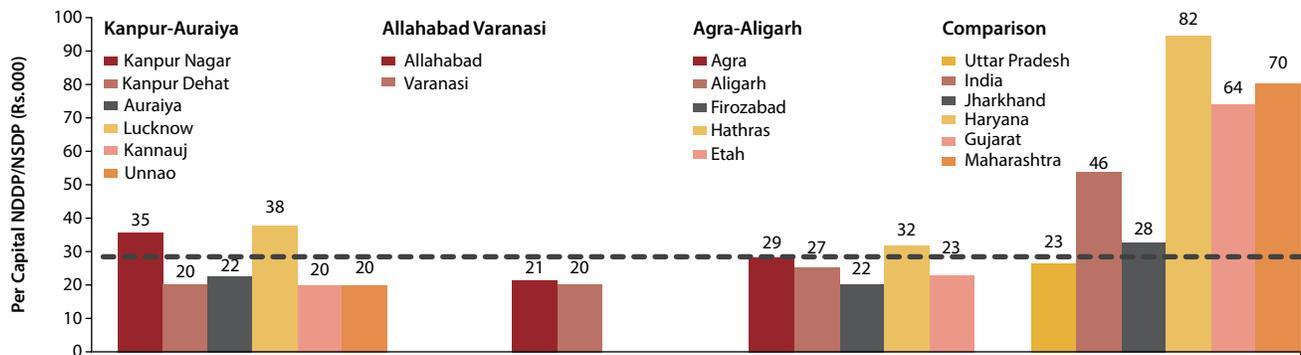
- ❖ **Power:** The per capita electricity consumption in most of the districts of

the three sub-regions is less than that of UP, other major AKIC/Delhi-Mumbai Industrial Corridor (DMIC) states and the rest of India. The shortage of power supply has resulted in poor and unreliable electricity in these areas with rampant power cuts. As a result, industrial investment in UP has been constrained, with industries preferring to locate elsewhere. In many cases, industries have been forced to put up their own power generators to support their operations.

- ❖ **Roads:** Availability of *pucca* roads (length in km) per lakh of population in most of the districts of the sub-regions is lower than the state average. In addition to the limited availability of roads, their carrying capacity is limited and maintenance remains poor.

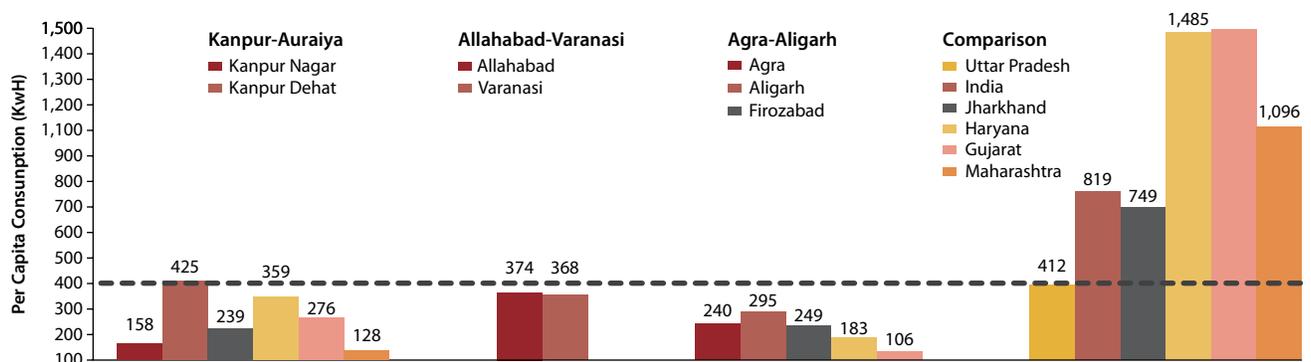
- ❖ **Water and Sanitation:** Overall, the access to water services in the state is quite low as compared to some of the other

**FIGURE 5:** Per capita GDDP: UP sub-regions and other states



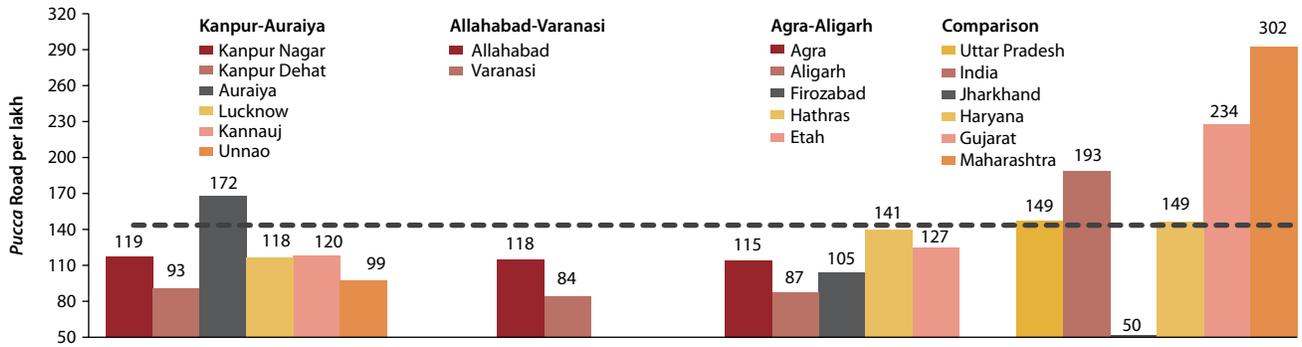
Source: Annual Survey of Industries, 2011.

**FIGURE 6:** Per capita power consumption: UP, sub-regions and other states

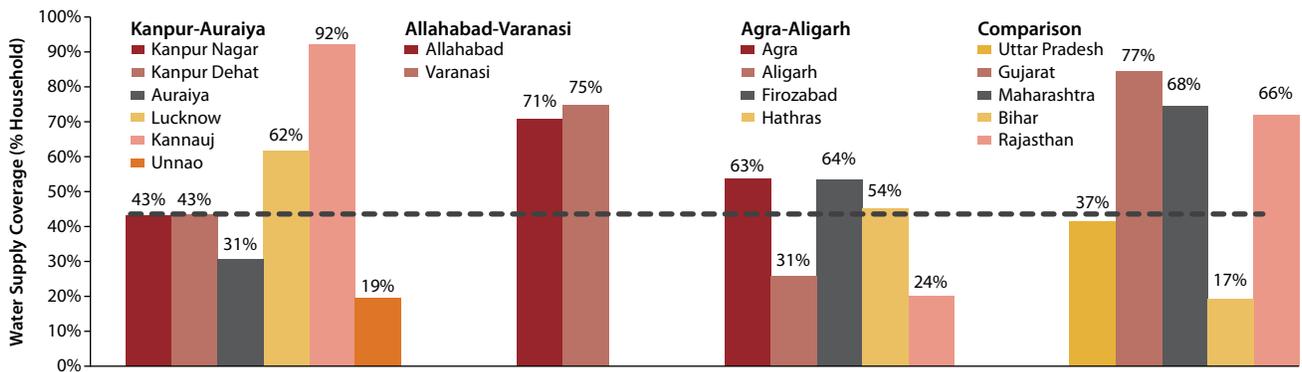


Source: UPPCL, CEA, 2011.

**FIGURE 7: Pucca roads per lakh population: UP, sub-regions and other states**



**FIGURE 8: Water supply coverage: UP, sub-regions and other states**



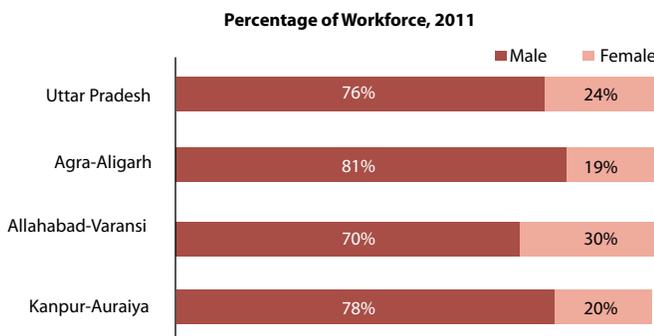
AKIC/DMIC states and there is scope for strengthening these services. As for sanitation (coverage of toilets), the state is performing slightly better with respect to some of the states in India.

infrastructure in the three sub-regions are discussed below:

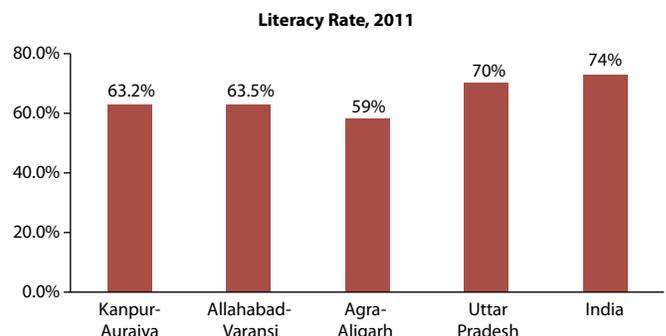
- Social Infrastructure:** The social infrastructure is reflected in the employment rate, participation of women in the workforce, literacy rates, and deprivation in basic necessities of wellbeing. Some of the key observations on the state of the social

- ❖ Across all the three sub-regions, more than 50% of the total population are in the working age group. However, less than 35% of the population is gainfully employed. Reasons behind low workforce participation can be attributed to lack of employment opportunities which is a derivative of the nature of labor demand.

**FIGURE 9: Percentage of workforce, 2011**



**FIGURE 10: Literacy rates: UP, sub-regions and India**



- ❖ In all three sub-regions, the female working population has grown considerably which shows that, with an increase in industries and rapid spread of education, females are more likely to get employed.
- ❖ UP lags behind the rest of India in terms of average literacy rate (69.72% state average compared to 74.04% national literacy rate). The three sub-regions lag behind both the state and national average literacy rates. This has implications on cluster performance in terms of productivity, skills upgrading and adoption of technology, among others.

## D. Conclusion

The three sub-regions collectively contribute a large share to UP's economy and industrial output, signifying the important role they play in the overall economic development of UP. Poor quality of physical infrastructure and inadequate access to skilled manpower, however, poses as a challenge to improving industrial performance in these sub-regions. Investments would need to be targeted to support the most promising industrial clusters in the three sub-regions to facilitate growth and development in UP. The succeeding chapter of this report identifies a group of inter-related industries or clusters that emerge as important contributors to the industrial landscape of UP and the growth impediments that would need to be addressed.



### 3. INDUSTRIAL CLUSTERS: PROSPECTS, LINKAGES AND IMPEDIMENTS

Industrial clusters exhibit interdependence and are mostly export-oriented. These characteristics give them the potential to generate employment and investment. Supporting their growth and development are therefore often strategically utilized to achieve broader development goals such as alleviating poverty and fostering shared prosperity within a region. This chapter identifies several promising industrial clusters in the three sub-regions of UP, their economic linkages and key impediments to their growth.

#### A. Identifying Key Industry Clusters

Clusters were preliminarily identified using a Location Quotient (LQ), which determines the industries that

employ and facilitate investment more (sub-region or district-wise) than the national average for that industry.<sup>1</sup> Industries which demonstrate a location quotient greater than 1.25 (i.e. 25% greater than the national average) are identified as a potential industrial cluster. Interviews and focused group discussions with key stakeholders were then used to validate the location quotients and determine whether the clusters have enough economies of scale that could merit future interventions or support. Based on this approach, 11 potential industrial clusters were identified in the three sub-regions (Table 1):

Top industry clusters for each sub-region were also identified based on their relative growth, industry

**TABLE 1:** Eleven potential industrial clusters in the three sub-regions of Uttar Pradesh

Kanpur-Auraiya	Agra-Aligarh Region	Allahabad-Varanasi Region
<ul style="list-style-type: none"> <li>Leather &amp; Leather Products Cluster (Kanpur &amp; Unnao)</li> <li>Plastic Packaging Cluster (Kanpur)</li> <li>Chikankari Cluster (Lucknow)</li> <li>Perfume and Fragrance Cluster (Kannauj)</li> <li>Hosiery Cluster (Kanpur)</li> </ul>	<ul style="list-style-type: none"> <li>Leather &amp; Leather Footwear Cluster (Agra)</li> <li>Foundry &amp; Light Engineering Cluster (Agra)</li> <li>Glass Ware Cluster (Firozabad)</li> <li>Locks, Building Hardware, Fabrication, Light Engineering Cluster (Aligarh)</li> <li>Food Processing - Flour, Dairy and Meat Cluster (Aligarh)</li> </ul>	<ul style="list-style-type: none"> <li>Silk Cluster (Brocade, weaving, dyeing, etc.) (Varanasi)</li> </ul>

1. Location Quotients (LQ) are calculated across two levels namely Macro and Micro level. The Macro level LQ provides a mapping of industries which are significant in the sub region. This Location Quotient has been titled as LQ-S and its formulation is as follows:

$$LQ-S = \left\{ \frac{\text{Investment or Employment in Kth Industry in Sub Region X}}{\text{Total Industrial Investment or Employment in Sub Region X}} \right\} / \left\{ \frac{\text{Investment or Employment in Kth Industry in UP}}{\text{Total Industrial Investment or Employment in UP}} \right\}$$

The Micro LQ provides a mapping of industries which are significant in the district. This Location quotient has been titled as LQ-D and its formulation is as follows:

$$LQ-D = \left\{ \frac{\text{Investment or Employment in Kth Industry in District I}}{\text{Total Industrial Investment or Employment in District I}} \right\} / \left\{ \frac{\text{Investment or Employment in Kth Industry in UP}}{\text{Total Industrial Investment or Employment in UP}} \right\}$$

The denominator of both the metrics has been kept the same in order to facilitate comparison between the two metrics. Industries which demonstrate an LQ>1.25 are considered as significant.

turnover (as an indicator for output) and employment generation over a five-year period (2005-2011):

- ❖ *Kanpur-Auraiya:* The Kanpur and Unnao leather units as well as plastic packaging units emerge as better performing clusters in the sub-region with average growth rates of 15-20% between 2005 to 2011. The leather and leather products industrial units from this region contribute nearly 17% of total exports of India for this sector. The plastic industry, especially the packaging segment has also grown in double digits in the last decade due to the increase in the use/consumption of plastic products. For other clusters in the region, the Cotton Hosiery units have maintained a steady growth rate of around 10% while the growth of Kannauj perfume and fragrance cluster has declined in the past few years. The decline of the perfume and fragrance cluster was due to the exodus of some of the bigger units to other states on account of the poor infrastructure in Kannauj. Also, since tobacco users are major consumer of perfume and fragrance products, anti-tobacco government campaigns have impacted its performance.
- ❖ *Agra-Aligarh:* Despite its relatively small turnover, Firozabad glass cluster emerges as a better performing cluster in terms of its high growth and employment rate. The Aligarh food processing cluster has experienced subdued growth rate in past five years but emerges as a significant cluster with relatively high turnover and employment. The Aligarh locks and building hardware, light engineering and fabrication cluster, employs a relatively lesser number of workforce but remains important in terms of turnover and growth. Other industry clusters such as Agra leather and Agra foundry are relatively low performing.
- ❖ *Allahabad-Varanasi:* The silk cluster in Varanasi (brocade, weaving, dyeing, etc.) has emerged as an important cluster in Allahabad-Varanasi region for further analysis. This sub-region belongs to the eastern part

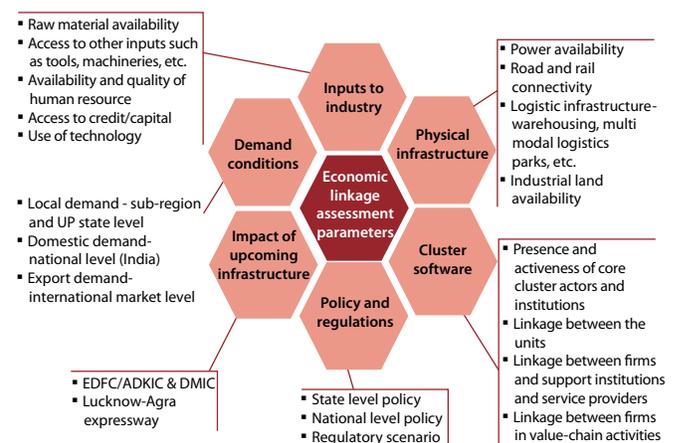
UP which is one of the least industrialized regions. As such, the silk weaving and brocade cluster was the only major cluster identified. However, a few industries such as agro-processing, agricultural implements and light engineering have shown to have growth potential and can be promoted to form a possible cluster in the future.

## B. Industrial Cluster Economic Linkages: An Assessment

Potential clusters were further analyzed in detail to determine economic linkages (Figure 11) based on key parameters such as demand conditions, inputs to industry, physical infrastructure, cluster software, policy and regulations, and impact of infrastructure such as the AKIC. This assessment is crucial in the determining gaps or weaknesses in the linkages that impact cluster growth. The following summarizes the results of the analysis:

1. **Demand:** Local demand is defined as demand that originated within the cluster region (Districts) and the State (UP) while domestic demand originates from other states in India. Export potential refers purely to foreign markets outside India. Local/domestic demand is generally strong for all identified clusters, which have helped them achieve their present scale. Most of the clusters also have strong export potential. Some clusters like Kanpur and Agra leather and Aligarh meat processing have been able to tap the export

**FIGURE 11:** Cluster analysis parameters



market because of the presence of active support institutions, adoption of modern technology, better awareness of market demand and trends, and strong policy focus. Clusters such as Lucknow chinkankari, Firozabad glass, Kannauj perfumes have large export potential but have not been able to capitalize on this prospect due to limited export channels, lack of quality standards, low access to technology, limited research & development, and low market awareness.

2. **Roads & Power:** While the situation of power supply or availability is better in clusters within Agra, Firozabad and Lucknow districts, it is an area of concern in the Aligarh, Kanpur and Varanasi. The overall road and rail infrastructure connectivity is better for the industrial units based in Lucknow and Agra. However, the quality of road infrastructure is poor and has affected the performance of most of the clusters in the sub-region.
3. **Input factors:** Traditional clusters, especially smaller players, face a common set of challenges such as not being able to leverage scale of procuring raw material, low technology adoption, lack of awareness of changing market demand, inadequate access to credit, low productivity, and skill upgrading issues, among others. Large and smaller players of many of the clusters do not collaborate and are not able to adequately leverage available institutional support. The Firozabad glass cluster is an exception wherein large and smaller firms are better linked and have been able to collectively leverage the institutional support for credit, use the latest technology and retain a skilled workforce.
4. **Institutional support:** Many clusters do not have a dedicated or strong industry association that could facilitate networking between firms and promote active clustering and cooperative initiatives. It was also observed that many clusters have limited interaction and weak linkage amongst the players, mainly due to inter-firm rivalry. The absence of dedicated institutions/associations, including service providers that can facilitate access to various markets, also limits forward linkages for the clusters.

5. **Policy and financing schemes:** Although there are several government (national and state) schemes supporting cluster development, these often focus on specific sectors (e.g. leather parks, plastic packaging, food processing etc.) or industrial production elements. However, cluster units are usually not aware of these schemes. In cases where they are aware, they often find it difficult to meet the qualifying requirements due to capacity constraints. A regional development rather than a cluster growth strategy would need to focus on a mechanism, which could help the units (especially the smaller units) conveniently avail integrated benefits of various schemes. Overall, high performing clusters are supported by favorable state and national policies, which explain their performance.
6. **Environmental considerations:** The growth of many of the clusters is linked to their units' successfully meeting environmental standards and carrying out manufacturing activities in a sustainable manner. This emerges as a significant issue in the Agra and Kanpur region.

Using these linkage parameters, industry clusters were mapped to determine priority clusters based on (i) feasibility and competitiveness (i.e. viability and competitive advantage due to favorable factor conditions such as strong linkages with demand, input, cluster software, etc.), and (ii) attractiveness and growth (i.e. ability to attract firms on account of high growth; largely derived from cluster turnover growth and favorable demand conditions). Clusters were further classified by significance:

- ❖ *The Economic Mainstay Clusters* - have traditional significance, and have been major contributors towards the sub-region's economy. These clusters have provided employment to a large segment of the population in that sub-region and have been growing at a stable rate.
- ❖ *The Pillar Clusters* – have emerged to be the driving force of industrial activities in the sub-region. These clusters are characterized as having high growth rates and also produce high levels of output. They exhibit strong cluster performance.

- ❖ *The Marginal Opportunities Clusters* – have low attractiveness and growth on account of relatively limited input and demand conditions.
- ❖ *Potential Promising Clusters* - have emerged in the last four-five years. These clusters may not have been traditionally significant, but have the potential to grow into Pillar Clusters if promoted through required interventions.

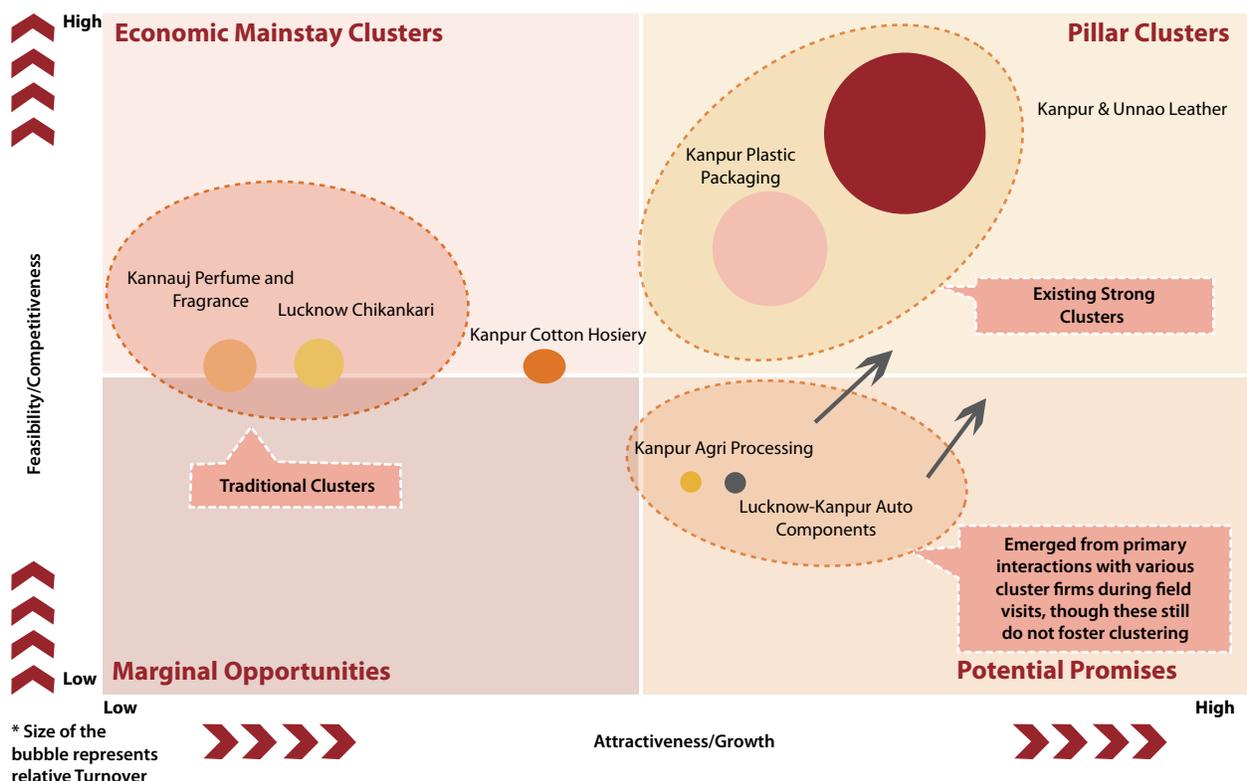
The mapping exercise is qualitative in nature and largely based on field interactions or discussions with cluster stakeholders such as firms, industry associations, districts industrial centers, and other related government agencies. Results reveal the following priority clusters in the sub-regions:

- ❖ *Kanpur-Auraiya*: Leather and leather products and plastic packaging clusters are better-positioned than other clusters. Marginal opportunities for development however exist for the perfume and fragrance and the cotton hosiery units unless interventions are made to support their growth. The

Agriculture-based cold storages (on account of high agricultural produce in UP) and food processing (primarily for potatoes that are available in large quantities in UP) along with the auto components sector (currently serves as feeders to large auto manufacturing establishments) have solid industrial foundation in the sub-region. These clusters exhibit potential promise for the future, especially if industrial infrastructure is developed and enhanced, and large industrial units are set up to sustain the ancillary units (refer Figure 12).

- ❖ *Agra-Aligarh*: The glass, leather, fabrication, light engineering and food processing clusters are primarily the best-positioned clusters, with high growth rates and significantly larger turnover. Agriculture based-cold storages and food processing clusters along with the auto components sector demonstrate potential for future growth, similar to the case of the Kanpur-Auraiya sub-region (refer Figure 13).

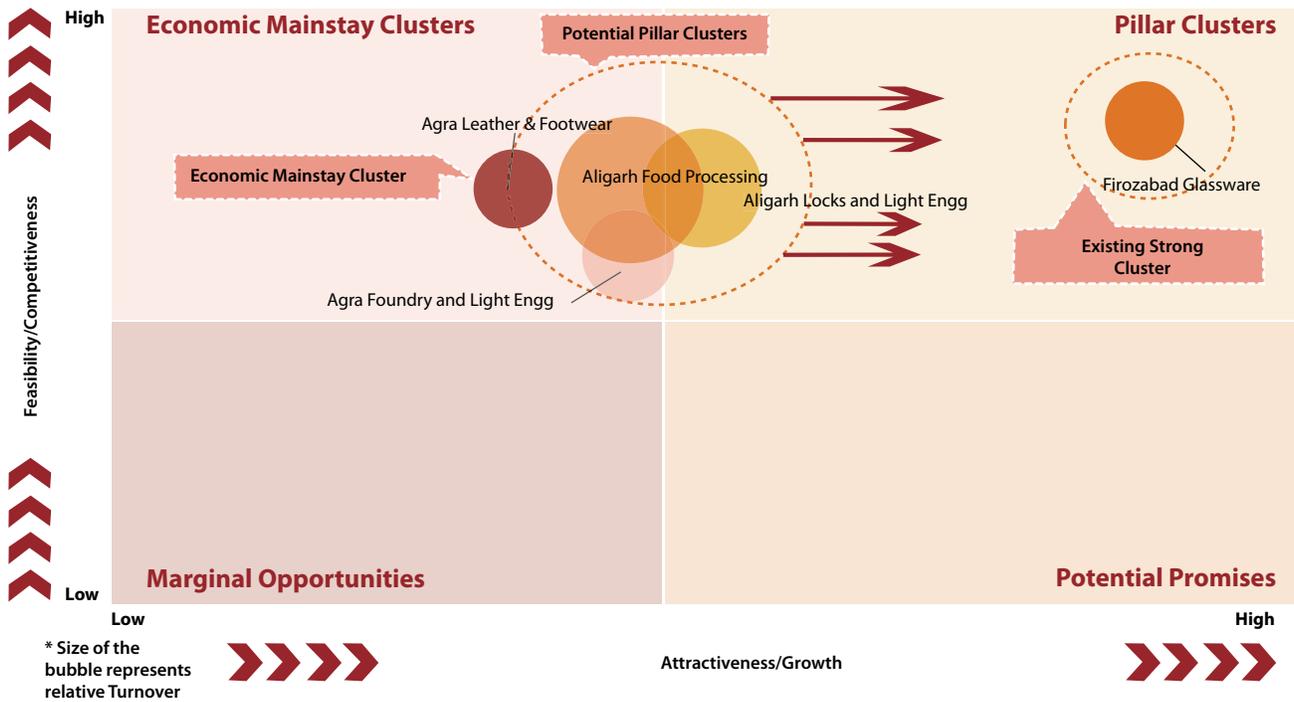
**FIGURE 12:** Kanpur-Auraiya industrial clusters mapping



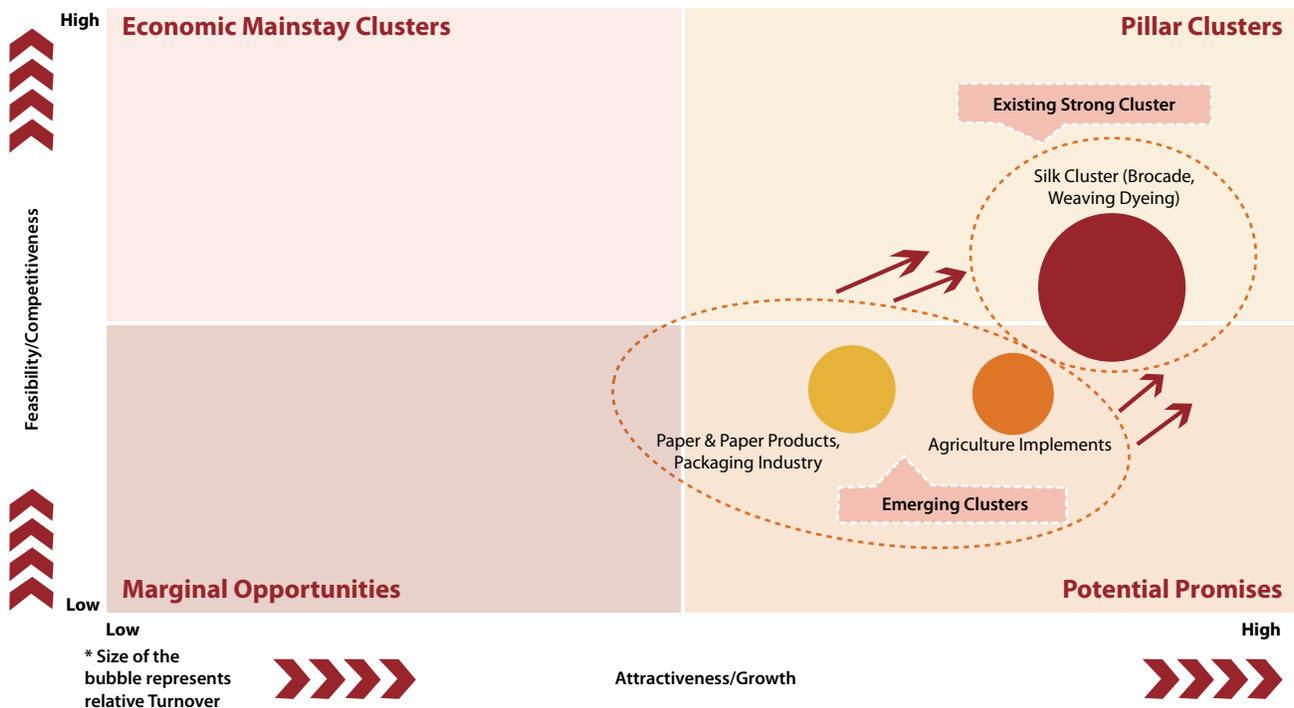
❖ *Allahabad-Varanasi*: The silk cluster is primarily the better-positioned clusters. They form the Pillar Clusters of the sub-region, exhibiting a high growth rate. Based on field interviews and discussions, (i) agro-based

industries, (ii) light engineering, (iii) agri implements, and (iv) paper and paper products could be developed as potential clusters in the sub-region (refer Figure 14).

**FIGURE 13:** Agra-Aligarh industrial clusters mapping



**FIGURE 14:** Allahabad-Varanasi industrial clusters mapping



## C. Impediments to Industry Cluster Growth<sup>2</sup>

Industry stakeholders in the three sub-regions identified and ranked (by severity) key impediments to the growth and performance of industrial clusters:

- 1. Lack of quality roads emerges to be a major impediment to growth for clusters across the three sub-regions as roads are the most preferred mode of transport (for accessing the inputs and markets) for many of the clusters:** The prime issue that emerges is the poor quality of road infrastructure which affects the lead times between procurement of inputs and distribution of final products in the market. This is important, since most clusters primarily depend on road infrastructure for transportation purposes. In some instances, particularly those for the Aligarh locks and food processing industries, there is a case for developing road infrastructure that provides them connectivity to input (rural hinterland around Aligarh) and output markets (Delhi National Capital Region).
- 2. Requirement of continuous and reliable power supply emerges quite strongly for many of the clusters in the three sub-regions:** Unreliable or intermittent power supply is creating uncertainties with respect to scheduling and completion of production processes for many clusters. Barring few districts such as Lucknow and Agra (22-24 hours of power supply/day), most of the districts suffer from intermittent power supplies with 4-6 hours/day shortages/outages particularly in Kanpur and Aligarh districts. However, it should be noted that some of the clusters like the Lucknow chikankari, Kannauj perfume and fragrance units, Kanpur cotton hosiery are less power-intensive.
- 3. Most districts in the sub-regions have a reasonable number of dedicated industrial estates.** However, these have largely remained underutilized resulting in sub-optimal utilization of resources and private sector arrangements for infrastructure provision. Based on stakeholder interviews, poor infrastructure provision and lack of recourse against allotted firms of the industrial park that have not started operations, are some of the key reasons for non-utilization of industrial areas.
- 4. The need for common facility centers like testing labs, design & training facilities, tool rooms, etc. is quite strong for most of the clusters in almost all the sub-regions.** Many of the clusters such as Aligarh locks, Kanpur-Unnao leather and leather products, Varanasi silk, Lucknow chikankari do not have testing facilities within their sub-regions and have to resort to testing centers/facilities in other locations. As a result, they are unable to meet the requirement of importers who mandatorily look for such type of testing and certifications. Common facilities like design and training centers along with tool rooms will provide industry players significant exposure to modern technologies. This would improve their competitiveness and enable them to meet global and domestic quality standards.
- 5. Although software infrastructure is moderately available for the clusters in the sub-region, the analysis and field interactions with key industry stakeholders reveal that it requires significant strengthening.** Industry cluster players require software interventions in the form of efforts to (i) strengthen industry associations, (ii) introduction of sector/cluster specific courses in the training institutes such as Industrial Training Institutes and polytechnics which also impact availability of skilled labor, (iii) improvement of credit facilities for all sizes of industry players, (iv) exposure and upgrading to modern technologies, and (v) creating awareness of available central and state government schemes, among others.

<sup>2</sup> Impediments analysis and assessment focused mainly on infrastructure aspects. Factors such as industrial policies, regulatory aspects, and capacity building are being addressed by a separate work carried out by the World Bank.

## 4. DEVELOPING AN INFRASTRUCTURE INVESTMENT STRATEGY FOR THE THREE SUB-REGIONAL GROWTH CENTERS

A number of infrastructure and software impediments that impinge on the competitiveness and growth of industrial clusters in the three sub-regions have been identified in the previous chapter. How should these be addressed? And given limited resources, what types of infrastructure investments should be pursued? This chapter presents an infrastructure investment strategy that can serve as a roadmap for GoUP in addressing the current and future infrastructure requirements of the industrial clusters in the three sub-regions. The first part discusses the planning and design principles by which priority infrastructure investments were identified or assessed. After which, elements of the proposed infrastructure strategy are presented. While beyond the scope of this technical note, priority should be given to software interventions including institution, policy and capacity aspects for industrial cluster development.<sup>4</sup>

### A. Planning and Design Principles

Figure 15 highlights the planning and design principles that emerged from the assessment of infrastructure impediments in the three-sub regions. These are built

**FIGURE 15:** Infrastructure planning and design principles

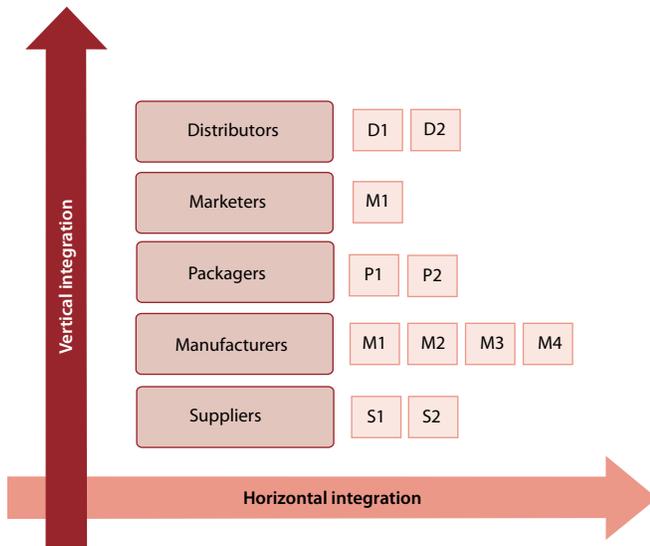


<sup>4</sup> The soft side intervention to enhance the overall industrial competitiveness and institutional capacity is being addressed by a separate stand-alone technical assistance by the World Bank and this note focuses on key infrastructure investment.

around the following pillars: industry integration, seamless connectivity, eco-friendly infrastructure and quality of life of workforce. These four pillars form the basis for identifying interventions that comprise the infrastructure strategy that will be discussed in the subsequent section. A short introduction to the planning and design principles is presented below.

1. **Industry integration** – To develop specialized industrial areas, infrastructure should cater to the horizontal and vertical integration of the industry and promote the development of emerging industries thereby driving diversification when there is such market demand. It should also support the development of anchor industries (large-scale industrial players that effectively creates a value chain around it) which play a key role in the development of ancillary industries.
  - ❖ *Horizontal and vertical integration of industry:* For horizontal integration, small and large units in clusters must be located close to each other and act as an aggregate market for raw materials and finished goods. This will create a scale and brand for industrial clusters. These units must be similar in nature and engaged in similar kind of production activities. For vertical integration, the industrial areas must provide for various types of small and large industries operating along the value chain. These units provide inputs and outputs to other units located nearby. This will create complementary production cycle and business stability. Ultimately, horizontal and vertical integration will result in a sizeable industry cluster with strong inter-linkages

**FIGURE 16:** Horizontal and vertical integration



and a robust brand for external suppliers and clients.

- ❖ *Diversification of industries:* In order to achieve a sustainable business economy, it is imperative to develop new or emerging industries that would drive growth in the long term. The industrial development in sub-regions must be integrated with these emerging industries to build a robust economy. For example, in the essential oils industry, new industries with forward linkages such as organic natural perfumes and aroma products, air freshening blocks, aerosols, gels, and cosmetics like deodorants, talcum powder, and soaps could be developed in a dedicated industrial park in Kannauj.
- ❖ *Development along anchor industries:* Anchor industries play a key role in the development of ancillary industries. Industrial development should focus on attracting large-scale industrial players and developing a value chain around it. For example, industrial areas with the provision for small leather industry units can be established near large leather product manufacturing units like the Mirza International and Super Tannery in Kanpur and Unnao.

2. **Seamless connectivity** – Industry clusters need to be integrally linked to transport and logistics

infrastructure that will facilitate the efficient movement of goods and access to markets. This in turn can drive shipping costs down thereby improving industry competitiveness.

- ❖ *Linkage of industry clusters with a dedicated freight corridor:* Currently, all the clusters depend on road transportation for raw materials and finished goods. Even though rail transportation is cheaper than road transportation, it is less preferred by industry units due to: (a) the longer amount of time required to transport goods, (b) missing end-to-end connectivity, and (c) cumbersome dispatch process. Connecting roads need to be developed from all the proposed AKIC stations to the nearest national highways and ring roads to provide seamless connectivity and facilitate movement of goods and services.
- ❖ *Integrated logistics development:* Currently, there are no strong road or rail linkages in existing industrial areas with truck terminals and inland container depots. A decentralized approach needs to be followed for the development of truck terminals. This also involves establishing an integrated freight terminal with a truck terminal and common warehousing near the industrial areas. The truck terminal should include area for parking, repair, and maintenance of trucks and accommodation and recreation facilities for drivers.
- ❖ *Regional transportation network:* In most parts of the sub-regions, industrial areas are accessible via two-lane roads. These access roads often face traffic congestion due to city traffic, trucks parking along the streets, and temporary encroachments. These roads need to be widened to four lanes to ease access to and from the industrial areas. Industrial areas also need to be inter-connected with a core road network to facilitate the access of potential workforce to industrial job markets and the timely transport of goods.
- ❖ *High-speed road corridor development:* The Kanpur-Lucknow highway is a major transport corridor within the region. This corridor needs to be developed into an access-controlled

six-lane expressway for the fast and efficient movement of goods and people. This will also improve connectivity of Kanpur with the Lucknow airport.

3. **Eco-friendly infrastructure** – Industrial sustainability is linked to successfully meeting environmental standards and integrating green technology in carrying out manufacturing activities. This entails the provision of management, treatment, and disposal of industrial waste, recycling treated wastewater, use of energy efficient lighting, and green cover along internal roads in industrial areas. The pollution and environmental impact of the existing industries, often caused by lack of environmental regulation and enforcement, is one of the big constraints for industrial competitiveness in UP. Hence, it will be important to ensure that adequate regulatory framework and enforcement are put in place.
- ❖ *Recycling of wastewater:* Treated wastewater (fully or partially treated) generated by the industries is channeled into local drains and nearby bodies of water. Since most of the industries depend on groundwater resources, it is imperative to reduce the water footprint through wastewater recycling and reuse. Recycling of wastewater would also encourage proper treatment of wastewater and abate the pollution caused by untreated or partially treated wastewater.
  - ❖ *Rainwater harvesting:* The water table in the sub-region is fast getting depleted due to unregulated groundwater extraction. Mandatory rainwater harvesting systems needs to be encouraged to support revitalization of groundwater resources and achieve sustainability in water use in the long term.
  - ❖ *Water treatment plants:* In most urban centers in the sub-regions, the installed water treatment capacity is below the total requirement. The installed capacity caters mostly to domestic use and does not cater to industrial water demand. Water treatment capacity needs to be increased to meet existing and future water demand, including for industrial use. This will reduce dependence on groundwater resources and lead to long-term water resource sustainability.
  - ❖ *Common Effluent Treatment Plants (CETPs)* is an essential environmental infrastructure required for water-intensive and polluting industries like leather and apparel. Industrial areas housing such units must be installed with CETPs with adequate capacity to meet environmental standards and improve the quality of life in the sub-region.
  - ❖ *Hazardous Waste Disposal Facility (HWDF):* Industries like leather, plastic packaging, and apparel generate hazardous waste that should be disposed off safely. The industrial areas housing such units must be installed with adequate capacity HWDF to meet environmental standards and improve the quality of life in the sub-region.
  - ❖ *Industrial waste management:* For non-hazardous industrial waste, this can be treated through a municipal waste management facility. Currently, this type of waste is dumped in open and low-lying areas or along the streets in industrial areas. Non-hazardous industrial waste management needs to be integrated with the municipal waste management system.
  - ❖ *Energy-efficient street lighting:* Most industrial areas do not have street lighting, creating safety and security hazard for industries and their workforce. With due regard to environmental concerns, the internal streets of industrial areas must be equipped with energy-efficient lighting fixtures. Using energy-efficient fixtures would reduce energy footprint and electricity bills.
  - ❖ *Green cover along internal roads:* The aesthetics and ambience of industrial areas are in a poor state. Provision of green cover along the internal streets would reduce the urban heat island effect and make streets more green and walkable.

4. **Quality of life of industrial workforce** – Successful industrial areas promote the improvement of the living conditions and productivity of its workforce.

- ❖ *Integrated industrial townships with affordable housing:* The planned industrial areas in the sub-region do not have an integrated housing component. However, in the case of successful industrial areas, there exists a “work-home” relationship whereby industrial workforce has access to housing in nearby residential areas in the city. In the case of the newly planned areas, it is required to provide for housing within a reasonable proximity to industrial areas. Further, the housing component must provide for affordable housing for the labor class.<sup>5</sup>
- ❖ *Efficient public transportation system:* Most industrial areas located away from city centers face labor shortages. Laborers find it too difficult and expensive to commute to faraway industrial areas. A public transportation system needs to be developed that could reduce the travel time, affordable and with frequent service during the peak hours.
- ❖ *Supporting social infrastructure:* Residential areas located close to industrial areas often lack basic support infrastructure like schools, health centers, and local shopping centers. Such areas must be provided with adequate social amenities.<sup>6</sup> In addition, security of workforce, especially women, must be ensured in the workplace through infrastructure and regulatory interventions. Given the steady rise of women in workforce in industrial clusters, key stakeholders such as industrial associations and local governments need to undertake specific measures to attract females into the job market.

5 The housing requirement would need to be looked into separately with more detail. This will entail assessment of critical building blocks for affordable housing including housing affordability, access to housing finance, land availability, land use regulations, among others.

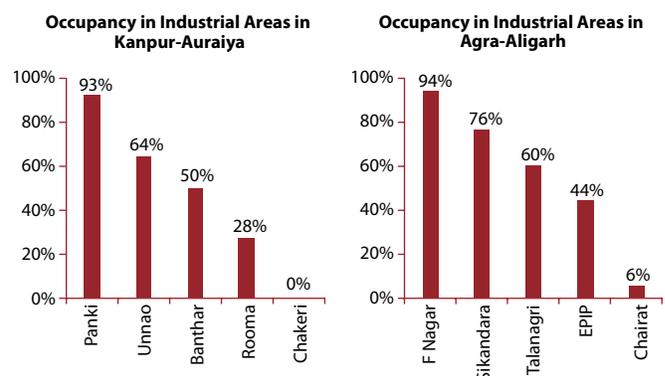
6 Detailed assessment on social infrastructure need to be carried out separately.

## B. Components of the Infrastructure Investment Strategy

To identify infrastructure requirements in the three sub-regions, a comprehensive assessment of the needs of the industrial clusters was undertaken. Based on this assessment and taking into account the design and planning principles outlined in the previous section, an investment strategy was developed. This section presents the components of the infrastructure strategy that aims to support the development and growth of industrial clusters in the three sub-regions:

1. **Component 1: Augmenting infrastructure in existing industrial areas** – A number of industrial areas have been developed by various government agencies in the three sub-regions and occupancy levels in these areas are diverse, ranging from almost full-occupancy (94%) to none (see Figure 17 and Annex 1). Upgrading existing infrastructure in these industrial areas is essential to improving productivity, profitability, and working conditions as well as in mitigating negative environmental impact of industrial activities. Below, the proposed infrastructure strategy outlines the interventions targeted at improving existing core infrastructure facilities and development of logistics and support infrastructure, including plug and play buildings. The strategy also recommends redevelopment of the Jajmau Industrial Area in Kanpur given its significance in the development of the district and its environmental impact on River Ganga.

**FIGURE 17:** Occupancy in industrial areas, Kanpur-Auraiya and Agra-Aligarh



## Core infrastructure interventions

- ❖ *New water supply scheme:* At present, water requirements in all industrial areas are met through individual groundwater bore-wells installed within their premises. As groundwater extraction is not sustainable in the long term, a surface water source needs to be developed. The scheme would include an intake well, a pumping system, a transmission network, a water treatment plant, service reservoirs, and a distribution network. All industrial connections would also need to be installed with a meter.
- ❖ *Upgrading effluent collection, treatment, and disposal system:* In Banthar and Unnao industrial areas, industrial effluent is treated up to the secondary level and discharged into the local drains. A zero discharge system (based on reverse osmosis) with provision for recycling of treated wastewater or effluent in both areas is proposed. The treated effluent shall be used for industrial purpose, dilution of sewage, and for gardening. In the industrial areas of Panki, Sikandara, Foundry Nagar, and Jalesar, effluent is discharged into local drains without any secondary treatment. A CETP, an effluent collection system, and a disposal line are proposed for these areas. In the case of Rooma, the effluent collection, treatment, and disposal systems need refurbishment with an additional effluent collection system and disposal line. For Chakeri, an effluent collection system and CETP are proposed given no such systems are in place.
- ❖ *Upgrading internal roads:* In all industrial areas, the quality of internal roads is poor and needs upgrading. Shoulders need to be constructed along the roads and the storm water drains need to be repaired.
- ❖ *Provision of streetlights and traffic signals:* There is no street lighting system in most of the industrial areas. A street lighting system needs to be installed to improve safety and working conditions in these areas.
- ❖ *Establishment of fire stations in industrial areas:* There is a need to establish a fire station with provision for at least two fire tenders. The fire station would require an office space and station

facilities, conference hall, drilling towers, a parade ground, parking areas and staff quarters. Requisite land may need to be identified within the industrial areas.

- ❖ *Cleaning of industrial areas:* Industrial areas would need to be cleared of debris and the storm water drains cleaned to prevent water logging along the streets and vacant plots.

## Logistics and support infrastructure

- ❖ *Provision of truck terminal and warehousing:* Currently, there is no truck terminal and warehousing facility in the industrial areas. Trucks are mostly parked along the streets, leading to congestion along internal roads. Due to lack of warehousing facilities in the industrial area, industrial units have to maintain large stocks and inventories within their premises. An integrated freight terminal with a truck terminal and common warehousing needs to be constructed in all the industrial areas. The truck terminal should include areas for parking, repair and maintenance, and accommodation and recreation facilities for drivers. The warehousing facility needs to be developed for common raw material bank/sales depot, etc.
- ❖ *Establishment of common facility centers:* A common facility center needs to be developed to support the shared requirements of industrial units in each industrial area. A facility center could include an area for the administrative building, a bank, a common logistics center, courier service, a conference hall, marketing display/selling center, an exhibition area, a training hall, restaurants, testing facilities, research and development centers, among others.
- ❖ *Establishment of skill development centers and/or re-orientation of existing institutions:* A skills development center that offers short term training to industry clusters will need to be established in industrial areas; where such centers already exist, they will need to be reoriented to offer relevant training. Training for workers in a leather cluster, for example, could include training on tanning operations, cutting and

stitching of finished leather, and packaging and labeling of finished products

- ❖ *Provision of public toilets and eating kiosks:* There is no provision for public toilets and eating kiosks within the industrial areas. These can be developed as part of the common facility center or separately.

## Development of plug and play buildings

A large number of micro-units are engaged in leather goods' manufacturing in the Kanpur-Auraiya and Agra-Aligarh sub-regions. In the absence of planned industrial areas for these units, many are operating from the residential parts of the city and face several physical infrastructure constraints (e.g. inadequate power and water supply, and lack of access to effluent collection and disposal system and transportation system) and difficulty in marketing their products in the absence of a common marketing infrastructure. The small and micro-units also find it difficult to establish new industrial units due to limited availability of capital for investment. Plug and play buildings can be developed within the undeveloped plots in existing industrial areas of Banthar, Unnao and Export Promotion Industrial Park (EPIP) to address limitations faced by these units (See Box 1). The government, through industrial development agencies such as UPSIDC or other relevant agencies, can take the lead in developing these plug and play buildings including the associated infrastructure, which they can later lease out to industrial units. Another option is to undertake the development of these buildings via Public-Private Partnership (PPP) wherein the government provides plots to private players to develop the buildings and earn revenue in the form of lease rentals from small and micro units.

## Redevelopment of Jajmau industrial in Kanpur

The Jajmau Industrial Area was set up in the early decades of the 20th century. In the 1970s, many of the tanneries operating from the central city of Kanpur were pushed to Jajmau Industrial Area where tanning activities were permitted. Currently, 80% of the tanneries in the Kanpur region are located in Jajmau. However, Jajmau Industrial Area suffers from poor infrastructure. The industrial area has to deal with interrupted power supply due to absence of an industrial feeder, narrow internal streets, and a CETP that only has 1/3rd (about 9 million litres per day) of the required capacity to treat tannery effluent.

Redeveloping Jajmau is important not only for the leather industry but also for the city of Kanpur and for restoring the vitality River Ganga. If implemented effectively, the redevelopment project could substantially improve productivity, working conditions and sustainability of the leather industry. It could also transform a strategically located, potentially high-value area of Kanpur city, and reduce river pollution. There have been schemes to relocate tanneries to new industrial estates but Jajmau continues to degenerate into a highly congested, polluted and hazardous industrial area.

The redevelopment can be done by either (i) relocating some tanneries to industrial parks outside Kanpur and use the available vacant land to improve the infrastructure and widen the existing road networks, or (ii) relocating all tanneries in Jajmau to industrial parks outside Kanpur. Under the first option, demolition and

### Box 1: Concept of Plug and Play Buildings

A concept of flatted-type readymade units of built-up area ranging from 50, 100, to 300 m<sup>2</sup> is proposed to cater to the dry operations of leather goods manufacturing in the Banthar and Unnao industrial areas in the Kanpur-Auraiya sub-region and the EPIP in the Agra-Aligarh sub-region. Apart from unit spaces, all required common infrastructure facilities and services (e.g. electricity, common lighting, lifts, loading/unloading facilities, water supply and drainage arrangement, security, canteen, etc.) are provided in plug and play buildings. Since the facilities are provided for and occupancy certificate has also been obtained, the entrepreneur can buy/lease such a unit with a minimum reasonable investment and immediately start operations. After units (or required units) are allotted, the entrepreneurs are expected to form a cooperative, which will take the responsibility of maintaining common areas by charging proportionate maintenance charges.

The concept of plug and play buildings is not new in India. It has received overwhelming response in the industrial areas Maharashtra, such as the Santacruz Electronics Export Processing Zone (SEEPZ), the Millennium Business Park in Mumbai, Electronics Sadan in Pune, and in other industrial areas in Marol, and Pune, Nasik, among others.

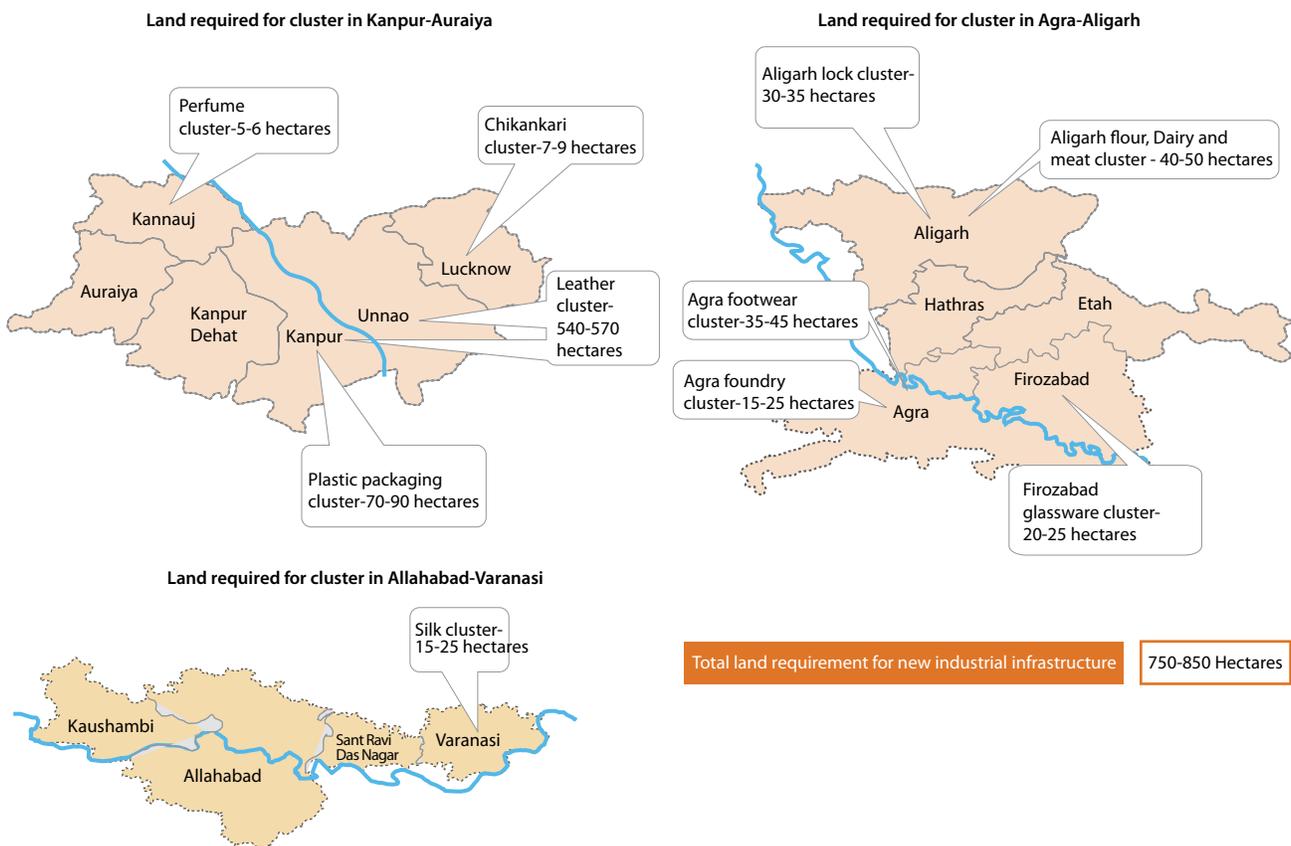
restructuring of industries will be required to widen the roads and upgrade basic infrastructure. Under the second option, the cost of relocation of tanneries can be met to a large extent, if not fully, through the redevelopment of the Jajmau area as a recreational, commercial and institutional hub.

**2. Component 2: Development of new industrial infrastructure to facilitate organized expansion of each cluster**– Industrial units in most of the clusters (except for chikankari) are operating in an urban setting. With the growth of cities, most industrial areas have been engulfed by the urban sprawl, and land available for the expansion of industries is scarce. If the growth of the clusters is to be maintained, new industrial areas have to be made available to cater to the need for setting up new production units. Based on growth and incremental turnover projections and taking into account increased efficiency and expansion of capacity in existing production

units, land requirement of a range of 750-850 hectares is estimated to be required for the sub-regions (See Figure 18)<sup>7</sup>.

The GoUP through UPSIDC and other agencies are already planning a number of expansion projects in existing industrial areas (see Annex 1). These are expected to cater mostly to industrial clusters in Kanpur (leather goods and plastic packaging) and Agra districts (See Table 2). There is sufficient land available to cater to the growth demands of leather and plastic packaging clusters in the Kanpur-Auraiya sub-region. For the Agra-Aligarh sub-region, the proposed and upcoming industrial areas are sufficient for the footwear cluster. There is, however, unmet demand for land for the following industrial clusters: (i) foundry and light engineering, (ii) glassware, (iii) lock-light engineering, and (iv) flour, dairy and meat processing. As there is no proposed industrial area for the silk cluster in Varanasi, the demand for industrial land is unmet.

**FIGURE 18:** Estimated land requirement for new industrial infrastructure



<sup>7</sup> This exercise is supposed to show a range of land requirements to support industrial growth and it is by no means definitive.

**TABLE 2:** Estimated land requirement for expansion of industrial clusters, in hectares\*

Cluster	Estimated land area required	Land under proposed projects	Unmet industrial area need
Leather goods, Kanpur	540-570	670	-
Plastic Packaging, Kanpur	70-90	141	-
Perfume Fragrance, Kannauj	-	-	-
Chikankari, Lucknow	5-6	-	5-6
Footwear, Agra	7-9	-	7-9
Foundry, Agra	35-45	49	-
Lock, Aligarh	20-25	-	20-25
Dairy, flour and meat, Aligarh	30-35	-	30-35
Glassware, Firozabad	40-50	-	40-50
Silk, Varansi	15-25	-	15-25
<b>Total</b>	<b>750-850</b>	<b>860</b>	<b>110-150</b>

\* Methodology: New industrial areas were estimated using the incremental turnover for each cluster (moderately optimistic projected turnover less the baseline figure for each cluster) taking into account the (i) efficiency and capacity enhancement of the existing units, and (ii) expansion in capacity of existing units or establishment of new production units. The new industrial area requirement is then adjusted to reflect available and upcoming additional industrial areas and the requirements for common infrastructure utilities and other support infrastructure.

The timely acquisition of land will be important for developing industrial areas and allied infrastructure, including for the provision of right-of-way for roads. Although the proposed projects in the sub-regions are under various stages of development, land availability remains a major concern. In some of the proposed projects, land has been notified and awarded but possession has yet to be secured due to the demand of local residents for increased compensation under the new Land Acquisition Act. Additional budgetary support from the state government may be required by UPSIDC to acquire land for the timely implementation of the proposed projects.

The new industrial areas would also need more than just the provision of industrial plots. An array of cluster-neutral core infrastructure facilities like roads, power, sewage, waste disposal, and water supply would need to be provided.

**3. Component 3: Developing sub-regional infrastructure** – An ecosystem of production and service facilities that support efficient production and competitiveness of clusters is vital to industrial growth. The proposed strategy identifies key infrastructure investments at the sub-regional level that supports and enhance the performance of each industry cluster:

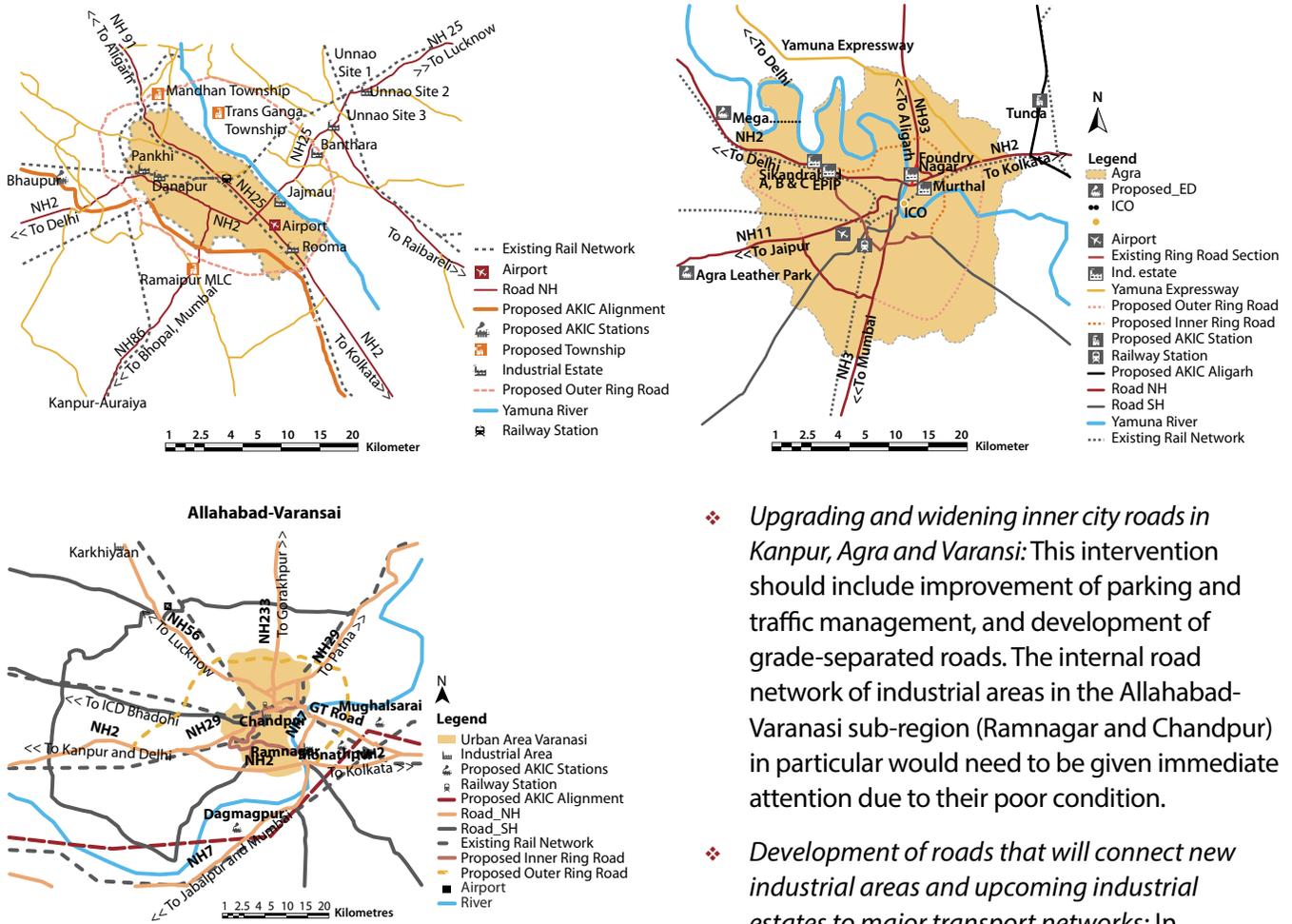
## Transport and logistics connectivity

Figure 19 presents the location of existing and proposed industrial estates in the Kanpur-Unnao (Kanpur-Auraiya), Agra (Agra-Aligarh) and Varanasi (Allahabad-Varanasi) districts with respect to the various existing and proposed transport and logistic infrastructure. These areas are connected to other major cities of UP and India via a network of state and national highways. Goods from these industrial estates are transported via these highways, which pass through their respective cities, creating a lot of pass through traffic that adds to the congestion level of internal city roads. Many of these city roads in the sub-region districts are in very poor condition and suffer from encroachment.<sup>8</sup> Interventions at the regional and sub-regional level were identified to facilitate better transport mobility on roads along the industrial hubs:

- ❖ *Development of inner and outer ring roads:* As a matter of priority, the inner and outer ring roads in Kanpur and Agra would need to be developed to enable traffic to bypass

<sup>8</sup> In Kanpur, for example, important roads such as Meston road, Canal road, Halsey road, Latouchey road, Birhana road, Nayaganj road, and Kidwai Nagar road are too narrow to cater to high volumes of traffic and are encroached on both sides, thus reducing effective carriageway and leading to severe traffic congestion.

**FIGURE 19:** Location of industrial estates and transport network in the three sub-regions



the core cities and reduce congestion.<sup>9</sup> In Varansi, a set of existing city roads have been identified to serve as the inner ring road while the National Highways Authority of India (NHAI) has proposed to develop a 59-km outer ring road through a PPP model. The upgrading and widening of Varansai's inner ring road would need to be prioritized by the Public Works and Department (PWD), while the outer ring road would need to be implemented at the earliest to reduce congestion in the city.<sup>10</sup>

9 The comprehensive mobility plans of Kanpur and Agra details out the alignment for the proposed ring roads. In Agra, parts of the inner ring road already exist. The inner and outer ring road projects need to be developed as a priority.

10 The alignment of the ring roads is provided in the Master Plan of Varansai for 2031.

- ❖ *Upgrading and widening inner city roads in Kanpur, Agra and Varansi:* This intervention should include improvement of parking and traffic management, and development of grade-separated roads. The internal road network of industrial areas in the Allahabad-Varansai sub-region (Ramnagar and Chandpur) in particular would need to be given immediate attention due to their poor condition.
- ❖ *Development of roads that will connect new industrial areas and upcoming industrial estates to major transport networks:* In Kanpur, new industrial areas such as the Sandila Mega Leather Cluster, Mandhana Township, the Trans-Ganga Township, and the Ramaipur Mega Leather Cluster, would need to be connected to the nearest inner and outer ring roads. A connecting road needs to be developed to the nearest national highways to provide seamless connectivity and facilitate movement from the proposed industrial estates in Agra such as UPSIDC's mega-leather park at Kirawali and a 62-acre mega-leather cluster at Seengna that is being promoted by the Agra Footwear Manufacturers & Exporters Chamber.
- ❖ *Development of roads connecting industrial areas in the three sub-regions to proposed AKIC stations* to ensure seamless connectivity and facilitate movement of goods from the industrial estates:

**TABLE 3:** Proposed interventions to connect industrial areas to AKIC stations

Item	Kanpur-Unnao	Agra	Varanasi
Proposed AKIC stations	<ul style="list-style-type: none"> <li>• Bhaupur</li> <li>• Bhimsen</li> <li>• Sarsaul</li> </ul>	<ul style="list-style-type: none"> <li>• Tundla</li> </ul>	<ul style="list-style-type: none"> <li>• Dagmaggpur</li> <li>• Jeonathpur</li> <li>• Mugulsarai</li> </ul>
Proposed intervention	Connecting roads from AKIC stations to nearest national highways	Connecting roads from proposed outer ring road to the AKIC station crossing over the national highway (NH2, without merging)	Connecting roads from outer ring road to the AKIC stations, crossing over the national highway (without merging)

- ❖ *Completion of flyovers and develop Railway Over Bridges (ROB):* The flyovers under construction in Kanpur (COD flyover and the Ramadevi flyover) by NHA would need to be completed to improve the connectivity of industrial areas in Rooma, Chakeri, and Jajmau with the rest of the city. ROBs would need to be developed in (a) Unnao-Jajmau railway crossing to enhance the connectivity of Kanpur city and Unnao, and (b) Chakeri railway crossing to improve accessibility of the Chakeri industrial area.
- ❖ *Development of decentralized truck terminals:* There are currently no truck terminals in Agra and Varanasi. Transport Nagar, a major terminal for goods in Kanpur, is located in the heart of the City and suffers from the poor condition of its narrow connector roads. There is a need to decentralize the facility to ease road congestion along Transport Nagar and inner city roads. Truck terminals in all sub-regions should be developed near industrial areas and provision for parking, repair, and maintenance of truck and accommodation and recreational facilities for drivers should be included.
- ❖ *Upgrade Chakeri Airport in Kanpur* to support reliable and frequent flight connectivity with the major airports in India (New Delhi, Bengaluru, Mumbai, Chennai and Kolkata) and enhance the growth of export-oriented clusters (leather and leather goods and plastic packaging these clusters).
- ❖ *Relocation of existing/Establishment of ICDs near the AKIC stations:* Existing Inland Container Depots (ICD)/logistic parks in Kanpur and Agra need to be relocated near the proposed AKIC stations in the long term. Once the land

for relocation of ICDs near AKIC stations is identified, connecting roads will need to be developed from the proposed ICD to the nearest national highways and/or ring roads. Varanasi on the other hand does not have its own ICD. It is dependent on the ICD of Container Corporation of India Limited located at Bhadohi, which is 42 km from Varanasi. The ICD was previously transporting goods by train to Jawaharlal Nehru Port Trust (JNPT) in Mumbai but due to insufficient volumes, it now transports goods via trucks to Kanpur. Goods are then sent from the Kanpur ICD to Mumbai Port. Owners of silk units in Varanasi prefer transporting international consignments by air instead of ICD as the goods are of higher value, and the faster delivery time provides savings through lower inventory cost. Technical and financial feasibility studies would need to be undertaken to assess the viability of establishing ICDs near the stations proposed along AKIC for other industrial clusters in Varanasi.

## Power

Power supply is critical to the operation of the industrial areas. But many industries (including within industrial areas with feeder connection) receive inadequate power supply with some units resorting to putting up their own generators to be able to operate effectively. This outcome is mostly due to the obsolete and inadequate power distribution infrastructure in these areas. Electric supply and distribution companies operating in the three sub-regions including Kanpur Electricity Supply Company, Dakshinanchal Vidyut Vitran Nigam Limited servicing parts of Agra-Aligarh sub-region, and Purvanchal Vidyut Vitaran Nigam

Limited in Varanasi, have identified interventions to upgrade and expand distribution infrastructure in industrial areas to ensure 24 hours of uninterrupted power supply. There are a few areas where power supply is adequate such as in the UPSIDC-developed Talanagri industrial area in Aligarh, which has an industrial feeder with adequate power supply from Dakshinanchal Vidyut Vitran Nigam Limited, and areas in Agra serviced by Torrent Power, a private sector company. To improve power supply in Agra, an option of extending the private distribution franchise of Torrent to cover industrial regions may be explored.

## Water management

Industrial areas in the three sub-regions depend on groundwater-based water supply system or individual groundwater bore wells to meet water requirements. This arrangement is not sustainable in the long-term. A decentralized surface water-based water supply system to meet industrial water demand should be explored to address potential groundwater overuse and depletion.

## Slaughterhouse and tanneries in Agra-Aligarh

Tanned leather for Agra's footwear cluster is sourced from Chennai, Kolkata, Kanpur, and Jalandhar. There is a severe shortage of tanned leather, and prices of leather have increased by 100% in the last three years. During field consultations, industry stakeholders suggest an integrated approach to address this shortage, whereby (i) cattle farming, (ii) slaughterhouses, and (iii) tanning industries need to be developed together. These industries can be established outside the Taj Trapezium Zone (TTZ), where there is no ban on tanning industries. TTZ is spread over six districts, namely Agra, Mathura, Firozabad, Hataras, and Etah of Uttar Pradesh and Bharatpur district of Rajasthan. The Taj Trapezium Zone also includes small parts of Aligarh district.<sup>11</sup>

<sup>11</sup> TTZ comprises forty protected monuments which include Taj Mahal, Agra Fort and Fatehpur Sikri. The Government of India declared an area of 10,400 sq. km around Taj Mahal as a sensitive zone. No industries with pollution potential are allowed to operate within this zone to protect the monuments from environmental damage caused by industrial pollution.

## Public transportation

Laborers working in industrial areas commute from various parts of the sub-regions. A bus-based public transport system connecting industrial areas and major locations within neighboring towns and cities is essential to improve availability of labor. Public transport access can also provide further impetus to establishment of new units in industrial areas such as in Ramnagar and Chandpur in Varanasi. A detailed traffic assessment and feasibility study would need to be undertaken to determine the required investment for a public transport system.

## Hotel and convention center

Kanpur city has only one five-star hotel (Hotel Landmark), which constrains it to holding or organizing conventions, trade fairs, etc. Industry stakeholders feel that with the establishment of five-star hotels and convention centers, exporters will be able to attract more foreign buyers, which in turn will support growth of the clusters. These types of facilities can be established in Jajmau industrial area once it is redeveloped as a recreation, commercial and institutional hub.

Below is a summary of the sub-regional infrastructure interventions for 11 industrial clusters in the three sub-regions given in Table 4.

## C. Investment Requirement

The investment required for each of the three components of the infrastructure strategy – augmenting infrastructure in existing industrial areas, new industrial infrastructure to support cluster expansion, and sub-regional infrastructure – have been estimated (see Annex 2) based on available information, industry benchmarks, local requirements, and planning and design principles. As discussed in Chapter 3, infrastructure and technical assistance to address software impediments (e.g. skills development center, support for establishing industry associations, capacity building programs, etc.) are equally vital in the overall strategy to promote the growth of

**TABLE 4:** Summary of common infrastructure interventions in three sub-regions

S. No.	Projects	Kanpur	Agra	Aligarh	Firozabad	Varanasi
<b>Population of Cities as per Census 2011 in Million</b>		<b>2.9</b>	<b>1.7</b>	<b>0.9</b>	<b>0.6</b>	<b>1.4</b>
1.	Development of inner ring road	✓	✓			✓
2.	Development of outer ring road	✓	✓	✓	✓	✓
3.	Upgrading of inner city roads	✓	✓	✓	✓	✓
4.	Development of decentralized truck terminals	✓	✓	✓	✓	✓
5.	Upgrading of airport	✓				
6.	Public transport system	✓	✓	✓	✓	✓
7.	Relocation/establishment of ICD near AKIC stations	✓	✓	✓	✓	✓
8.	Roads connecting industrial areas to AKIC stations	✓	✓	✓	✓	✓
9.	Upgrading of power supply distribution infrastructure	✓	✓	✓	✓	✓
10.	Completion of flyovers under construction	✓				
11.	Development of Railway Over-Bridges (ROB)	✓				
12.	Development of surface water-based system	✓	✓	✓	✓	✓
13.	Development of hotel and convention center	✓				

**TABLE 5:** Estimated requirements for the three sub-regions, in million Rs. current prices

Investment Item	Kanpur Auraiya	Agra Aligarh	Allahabad Varanasi	Total
1. Augmentation of infrastructure in existing industrial areas	920	330	10	1260
2. New industrial infrastructure required for expansion	570	170	500	1240
3. Sub-regional infrastructure	2700	1300	850	4850
<b>Total Investment Required for Industrial Infrastructure</b>	<b>4200</b>	<b>1800</b>	<b>1400</b>	<b>7400</b>
<b>Total Investment Required for Industrial Infrastructure (in US\$ crore)</b>	<b>680</b>	<b>300</b>	<b>220</b>	<b>1200</b>

Source: See Annex 2. Estimates for the following projects are not included as these need to be determined through separate technical studies:

(i) the relocation of ICDs near AKIC stations, (ii) upgrading of the Chakari airport, (iii) development of public transport systems, (iv) development of ring roads in Firozabad, and (v) the upgrading of power distribution network in the Agra-Aligarh and Allahabad-Varanasi region.

industrial clusters. These have been included in the estimated investment requirements (about Rs. 100 million per industrial cluster).

An estimated total investment of Rs. 73 billion (excluding the cost of land) is required for the development of industrial infrastructure for the three sub-regions (see Table 5; a breakdown by project is presented in Annex 2) or about 1% of UP's 2012-13 GSDP.<sup>12</sup> This figure however is considered

conservative as estimated investments for a number of recommended projects are yet to be determined through follow-on technical studies.<sup>13</sup>

How can these infrastructure requirements be met? The possible sources of funding are discussed in the following chapter.

<sup>12</sup> UP GSDP is Rs. Cores 783,285 for 2012-13 at current prices. Source: [http://planningcommission.nic.in/data/datatable/data\\_2312/comp\\_data2312.pdf](http://planningcommission.nic.in/data/datatable/data_2312/comp_data2312.pdf)

<sup>13</sup> No estimates were given for (i) the relocation of ICDs near AKIC stations, (ii) upgrading of the Chakari airport, (iii) development of public transport systems, (iv) development of ring roads in Firozabad, and (v) the upgrading of power distribution network in the Agra-Aligarh and Allahabad-Varanasi region.

# 5. FINANCING THE INFRASTRUCTURE REQUIREMENT

Given the scale of infrastructure requirements to support the growth of industrial clusters in the three sub-regions, it is clear that financing will be an important element of the infrastructure strategy. This section presents possible sources of financing that can be tapped to fund the implementation of the infrastructure strategy.

## A. Central Funding

The Government of India can support the development of industrial infrastructure via the following types of financial assistance:

1. Sector-specific financial assistance – These include programs targeted to enhance the development of selected industries and are usually administered by the line ministries or the Ministry of Commerce and Industries, Gol. Examples of these programs include:
  - ❖ Indian Leather Development Program for leather and leather products industry, administered by the Ministry of Commerce and Industry, Gol.
  - ❖ Scheme for Integrated Textiles Park for textiles and readymade garment industry, administered by the Ministry of Textiles, Gol.
  - ❖ Mega Food Park Scheme for agro and food processing industry, administered by the Ministry of Food Processing, Gol.
  - ❖ Plastic Park Scheme for plastic industry, administered by the Ministry of Chemicals and Fertilizers, Gol.
  - ❖ Comprehensive Handloom Cluster Development Scheme for silk cluster, administered by Ministry of Textiles, Gol.
2. General industrial infrastructure financing – Gol also provides assistance for the development or expansion/upgrading of industrial infrastructure such as:
  - ❖ Modified Industrial Infrastructure Up-gradation Scheme administered by Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Gol.
  - ❖ Assistance to States for Development of Export Infrastructure administered by the Department of Commerce, Ministry of Commerce and Industry, Gol.
3. Financial schemes for micro, small, and medium enterprises – Gol is providing financial assistance for the development of micro, small, and medium industrial units through the Micro and Small Enterprise Cluster Development Program. Administered by the Ministry of Micro Small and Medium Enterprise, Gol, the Program can be tapped to develop or augment common facility centers and infrastructure targeting micro, small, and medium units. In addition, the Ministry also provides financial assistance to state governments for the establishment of mini tool rooms.
4. Viability gap funding for PPPs – Gol can provide a one-time or deferred grant (as Viability Gap Funding or VGF) to an infrastructure project undertaken via a PPP arrangement. The objective

**TABLE 6:** Summary of industrial infrastructure requirement and corresponding Gol funding options

Infrastructure Requirement	Gol Financial Assistance Schemes
1. Augmentation of infrastructure in existing industrial areas	<ul style="list-style-type: none"> <li>• Modified Industrial Infrastructure Upgradation Scheme</li> <li>• Assistance to States for Development of Export Infra</li> <li>• Micro and Small Enterprise Clusters Development Program</li> <li>• Indian Leather Development Program</li> </ul>
2. New industrial infrastructure required for expansion	<ul style="list-style-type: none"> <li>• Indian Leather Development Program</li> <li>• Scheme for Integrated Textile Parks</li> <li>• Mega Food Parks Scheme</li> <li>• Plastic Park Scheme</li> </ul>
3. Sub-regional infrastructure	<ul style="list-style-type: none"> <li>• Viability Gap Funding (for PPPs)</li> <li>• Assistance to States for Development of Export Infrastructure</li> <li>• Micro and Small Enterprise Cluster Development Program</li> </ul>

of the VGF is to make an economically justifiable project commercially viable or attractive to the private sector. The VGF is administered by the Ministry of Finance and can only fund up to 20% of the project cost. PPP arrangements with VGF are best suited for infrastructure projects that have the potential to generate a predictable stream of cash flow (e.g. investment costs can be recovered through user charges).

Overall, Gol has approved a total grant of Rs. 18,400 crore to various states from 1994 under these various schemes. Uttar Pradesh's share in the total grant is only 7.7% (Rs. 1,400 crore) mostly from the Indian Leather Development Program. The GoUP can target financial assistance from a mix of these Gol schemes to meet the infrastructure requirement of the sub-regions. A matching of funding sources with the identified infrastructure requirement is presented in Table 6.

## B. State Funding

Government of Uttar Pradesh announced a new Infrastructure and Industrial Investment Policy in 2012 with an objective of attaining an industrial growth rate of 11.2% per annum. The policy aims to promote UP as the most preferred investment destination in India by accelerating industrial development, creating a more favorable business environment and developing well functioning infrastructure facilities. Some of the highlights of the existing policy are provided below:

1. Land for industrial parks – The state government considers the provision of land for the establishment of industrial areas/estates and new industrial units as a key priority given its importance in the growth and development of industries. Under the policy, UPSIDC and other industrial development authorities are mandated to strengthen and expand their land banking activities by identifying unutilized government land for the development of industrial areas. The state also recognizes the importance of formulating a specific policy to support the development of integrated industrial townships along the expressways and state highways.

In light of the requirements of the industrial sector, the UP Infrastructure and Investment Policy acknowledges the importance of its role in facilitating private sector initiatives in establishing industrial areas and estates and includes incentives for the private developer. For example, the state offers the private developer a 25% reimbursement of the stamp duty paid, subject to the condition that the industrial area or industrial estate has been developed, and at least 50% of the land has been sold within three years from the date of purchase of land.

2. Financial assistance for industrial units – Key financial incentives are provided to industrial units under the policy, such as:

- ❖ Stamp duty concessions, depending on sector type, location of industrial units, and purely private infrastructure development projects, among others.
  - ❖ Five-year exemption from *mandi fee* for the purchase of raw materials of new food processing units with an investment of Rs. 50 million or above in plant, machinery, and spare parts.
  - ❖ Various investment promotion schemes such as interest free loan in certain industrial units.
  - ❖ Capital interest subsidy scheme for new industrial units.
  - ❖ Infrastructure interest subsidy schemes for development of infrastructure facilities for the industrial unit's specific use (e.g. roads, sewers, water drainage, and power lines).
  - ❖ Industrial quality development subsidy scheme for industrial associations and group of industrial units for establishing testing labs, quality certification labs, tool rooms, etc.
  - ❖ Employee Provident Fund reimbursement scheme (50% for 3 years) targeting any new industrial unit employing more than 100 unskilled workers.
3. Financial assistance for Mega Projects – Mega Projects are private or joint venture (with government or any public sector enterprise equity less than or equal to 49%) industrial units with proposed investment of Rs. 200 crore or more. These projects act as anchor industrial units in their respective fields as they have the potential to generate employment on a large scale, promote micro and small sector industrial units and bring indirect benefits to the state. UP aims to establish more such projects to attract capital investment and transform the state into one of the most competitive investment destinations globally.

Under UP's 2012 policy, the state government provides all financial incentives for Mega Projects with an investment of more than Rs. 200 crore but less than Rs. 500 crore subject to appropriate

conditions<sup>14</sup> and prioritizes the allotment of land, water, power connection, etc. for these projects. The state government also may provide either partially or wholly the required infrastructure facilities such as roads, power line, sewer line, and water drainage.

## C. Public-Private Partnerships

The development of industrial areas in Uttar Pradesh is largely government driven. UPSIDC acquires land and develops industrial areas/estates on its own and later either operates and manages these industrial areas on its own or hands them over to an appropriate industrial association. The marketing and branding of the industrial areas is also done by UPSIDC. Augmenting infrastructure in existing industrial areas and developing new industrial infrastructure however would require more than government resources. GoUP/UPSIDC could meet some of the infrastructure requirements via PPPs to leverage private sector financing and generate value for money by i) incentivizing on-time and within-budget delivery, ii) optimizing the life cycle costs, iii) providing an opportunity to innovate, and iv) optimizing the allocation of project risks between the contracting parties (public and private entities).

GoUP has already formulated a PPP policy framework and supporting guidelines to attract private sector investments and ensure transparent implementation of PPPs.<sup>15</sup> The development of industrial estates and parks are in fact included in the list of projects for which

14 The maximum financial limit of such incentives could be relaxed on case-to-case basis after the recommendation of the Empowered Committee and approval of the Hon'ble State Cabinet of Ministers. However, mega projects of this category will not be allowed any incentive that is not covered under the Infrastructure and Industrial Investment Policy, 2012.

15 The policy framework for potential PPP projects covers a) steps, procedures, and documents for PPPs, b) procedure for selection and contract with PPP project developers, c) schedule with an indicative list of projects for which the PPP route may be considered, d) schedule on the nature of concession agreements, e) memorandum for the PPP Evaluation Committee, f) term sheet of the proposed concession agreement, etc. The PPP guidelines include a) Policy Framework for selection of Consultants for various Studies, b) Policy Framework for Participation by Persons (Developers) Other Than the State Government and Government Agencies, c) Policies and Procedures for Disinvestment of State Public Sector Undertakings, and d) Complete Guidelines for Selection of Consultants/Advisors, Developers for PPP Projects & Private Partners for Disinvestments.

a PPP arrangement may be considered. In addition, infrastructure projects that are vital to operation and growth of industries in industrial areas, such as power, roads, urban transportation, civil aviation, solid waste management, water supply, education, and health, can be developed via the PPP track. The Empowered Committee, in accordance with the rules and limits stipulated by the state government and Gol, can consider viability gap financing to support PPPs if required and appropriate.

## **D. Conclusion**

A number of financing schemes are currently available, including central and state assistance – grants and subsidies– that specifically target the industry sector. These can be tapped to meet the

investment requirement partially. Ensuring successful implementation of the proposed investment strategy however would entail a mix of resources, including from the private sector primarily through PPPs (equity and debt). It must be recognized, however, that the extent of government support would vary from project-to-project and would need to be carefully evaluated and structured as it could potentially lead to fiscal problems and contingent liabilities, especially projects involving PPPs. Projects, whether public or some form of PPP, should be adequately assessed based on technical, economic and financial parameters. In addition, any proposed PPP project would need to be evaluated on its potential to deliver value for money with due regard to efficiency and effectiveness vis-a-vis the traditional method of government procurement.

## 6. WAY FORWARD: PRIORITIES FOR THE THREE SUB-REGIONAL GROWTH CENTERS

An assessment of the 11 potential industrial clusters in the three sub-regions reveals a number of infrastructure and cluster software impediments that constrains them from further growth and effectively leveraging the development of the AKIC. An infrastructure investment strategy has been proposed to address the need to augment infrastructure in existing industrial areas, develop new industrial infrastructure and develop or strengthen common infrastructure at the regional level. The total funding requirement to implement the strategy was estimated at Rs. 7,305 crores. The amount could be higher once technical studies for some of the identified projects are undertaken, depending on the findings of the studies.

In terms of timing, with the aim of implementing the strategy over the next ten years, action can be prioritized in the following order:

1. *Provision of software assistance to industrial cluster (implementation within Year 1):* This can be easily undertaken within a year to address the current gaps in skills and institutions. Soft infrastructure assistance to the 11 industrial clusters in the three sub-regions would involve:
  - ❖ Establishing/strengthening industry associations.
  - ❖ Creating awareness regarding various schemes of state and central governments from where technical and financial assistance can be availed.
  - ❖ Organizing training programs, seminars, workshops, and study tours to other clusters,

demonstration of technology equipment including expert fees, travel, lodging, boarding, etc.

- ❖ Capacity-building (exposure visits, benchmarking, brochure preparation, website launching, initial recruitment, etc.).
  - ❖ Facilitating the participation of industry cluster entrepreneurs in foreign fairs.
  - ❖ Supporting building awareness of social infrastructure requirements such as health centers, schools and crèches, and public spaces among key stakeholders. Creating a gender inclusive work environment that encourages women participation is also important.
2. *Improving infrastructure in the existing industrial areas (implementation within Year 1 to Year 3):* The occupancy level of the existing industrial areas varies from 0% to 94% in the three sub-regions. Before new industrial infrastructure is created, it is imperative that the existing industrial areas are better utilised. The expansion and upgradation of these industrial areas will improve productivity, profitability, and working conditions as well as mitigate negative environmental externalities for the cluster units located within these industrial areas. There is also a case for inclusion of support soft infrastructure such as marketing infrastructure, research and development facilities, and training and skill development facilities.

3. *Piloting the development of new industrial areas (implementation within Year 1 to Year 3):* For the industrial areas that have already been planned and for which UPSIDC already secured land, the development of new industrial areas can be implemented in the short run. Development of these areas has to be accompanied by provision for adequate infrastructure as well as support to soft infrastructure.
4. *Development of common infrastructure (implementation from Year 3 to Year 6):* The efficiency of the clusters depends very much on the general efficiency of the region. This in turn will depend on the quality of infrastructure available at the sub-regional level. Sub-regional infrastructure investments include the development of regional road networks and reduction of traffic congestion, improvement in connectivity through airports, improvement of power supply systems, and increase of access to public transport systems.
5. *Development of new industrial infrastructure (implementation from Year 6 to Year 9):* New industrial infrastructure would be required in the medium to long term to foster further growth of clusters. The new industrial areas have to be comprehensive and provide more than just plots;

these have to provide a facilitative environment that would improve the overall competitiveness of the clusters. Investments under this category include the development of new cluster-neutral infrastructure (e.g. roads, power, sewerage, waste disposal, and water supply and required cluster-specific facilities (e.g. CETPs for leather tannery units).

Annex 3 presents the timeframe for the recommended infrastructure interventions for each of the sub-region.

Implementing the strategy is by no means unattainable as there a number of funding sources already available, including those targeted specifically to support the industrial sector. Also, a number of projects can be implemented via PPP in accordance with the existing PPP guidelines of the government. In fact, much of the enabling environment (e.g. regulatory and institutional frameworks, guidelines, etc.) is already in place for successful implementation of the suggested strategy. By implementing identified investment priorities in the suggested order or hierarchy discussed above, GoUP could lay the ground work for obtaining results in the near term while building the foundation for longer-term industrial growth.

# ANNEX 1. EXISTING AND PLANNED INDUSTRIAL AREAS IN THE THREE SUB-REGIONS

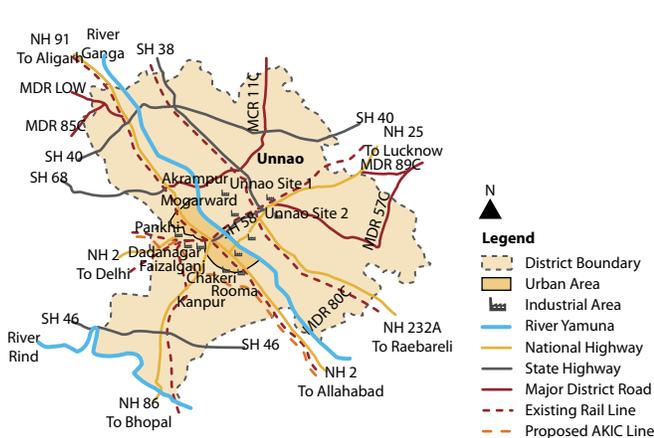
## Industrial areas in the Kanpur-Auraiya sub-region:

The six key industrial areas in the Kanpur-Auraiya sub-region are: i) Panki, Rooma and Chakeri industrial areas in Kanpur, ii) Unnao and Banthar industrial areas in Unnao district, and iii) Makrand Nagar industrial area in Kannauj. Of these, Panki is the oldest industrial area; Unnao and Banthar later emerged as industry needs particularly shifted towards the production of leather units. Rooma is a relatively newer industrial area, established in Kanpur and has been developed specifically for the hosiery garment and textile industries. The Chakeri industrial area is the latest and is in the process of being developed as a mixed-type industrial area for plastic packaging and hosiery garments. Panki is a well-established industrial area of Kanpur with diverse industries including a large number of plastic packaging units as well as hosiery garments units. Makrand Nagar in Kannauj is mostly home to perfume fragrance and allied industries.

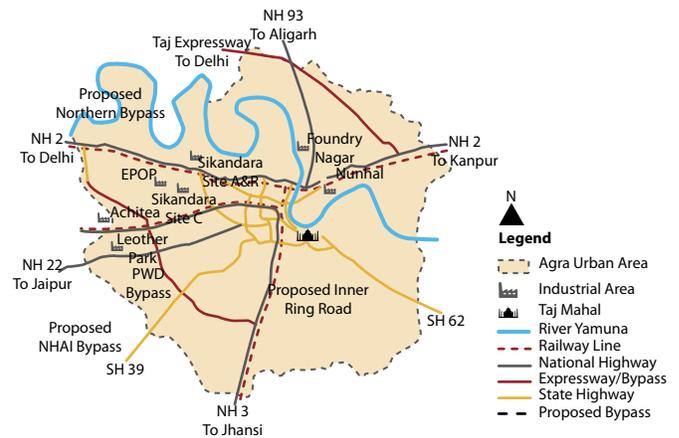
## Industrial areas in Agra-Aligarh sub-region:

The seven key industrial areas in the Agra-Aligarh sub-region are: i) Sikandara, EPIP, Foundry Nagar and Nunhai industrial areas in Agra, ii) Talanagari and Chairat industrial areas in Aligarh, and iii) Jalesar/Firozabad industrial area in Firozabad. Of these, Foundry Nagar and Nunhai are the oldest industrial areas, followed by Sikandara and Tala nagari. Chairat, Jalesar and EPIP are the later additions. Foundry Nagar and Nunhai house a large number of foundries and light engineering units, while Sikandara is dominated by footwear and light engineering units. EPIP is a mixed industrial area with a significant number of footwear and light engineering units. Talanagari predominantly houses locks and light engineering cluster units while Chairat is an emerging center for the flour, dairy and meat processing industries. Jalesar is also an emerging industrial area with a predominance of glassware units.

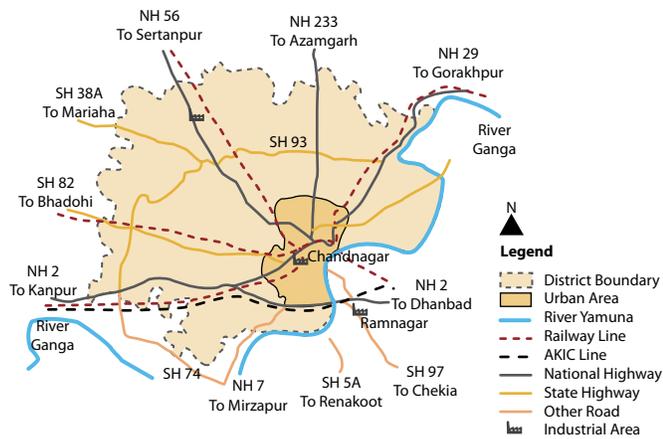
Industrial Aareas in Kanpur-Unnao



Industrial Areas in Agra



### Industrial Areas in Varanasi



### Industrial areas in Allahabad-Varanasi sub-region:

There are two industrial areas in Varanasi: one in Ramnagar, set up by UPSIDC, and the other in Chandpur, set up by District Industrial Center.

The Ramnagar industrial area is 30 km from the city and the Chandpur industrial area is 5 km from the city. There is no dedicated industrial park for the silk industry in Varanasi. The industrial estate in Ramnagar has industrial units for chemicals, plastics, agro, and cattle feed industries and the industrial estate at Chandpur has industrial units for textile, electronics, plastics, agriculture equipment, and carpet industries. The silk cluster in the Allahabad-Varanasi sub-region is spread across geographically. Mostly, micro, small, and medium-scale units are located in and operate from the old residential, commercial, and mixed-use areas of the city in Varanasi. Since the silk cluster is a handloom/craft cluster, the units are not located in the industrial areas as micro-units require small-sized plots ranging from 25 sq.m to 100 sq.m, whereas the plots available in the industrial areas of Ramnagar and Chandpur are medium and large-sized plots varying from 450 sq.m to 14,000 sq.m.

## ANNEX 2. ESTIMATED INVESTMENT REQUIREMENTS

**Estimated investment requirement for the three sub-regions: this is to provide a rough magnitude of investment requirements and does not mean to be definitive**

All figures unless stated are in rupees crores

Component 1: Augmenting infrastructure in existing industrial areas	Kanpur-Auraiya	Agra-Aligarh	Allahabad-Varanasi	Total (Rs.Crore)
New water supply scheme	832	432		1,264
Effluent collection, treatment, disposal system	350	103		453
Street lights, traffic signals	90	76		166
Fire station	325	235		560
Cleaning of industrial area	12	22		34
Boundary wall	45			45
Upgrade of internal roads	839	552		1,391
Truck terminal, warehousing	215	280		495
Common facility center	250	313	87	650
Skill development center	20	160	50	230
Plug and play buildings	250	125		375
Public toilets and eating kiosks	90	89		179
Redevelopment of Jajmau Industrial Area	5,865			5,865
Infrastructure for meat processing units at Aligarh		885		885
<b>Total Component 1</b>	<b>9,183</b>	<b>3,272</b>	<b>137</b>	<b>12,592</b>
<b>Total Component 1 (US Dollars Million)</b>	<b>1471.68</b>	<b>524.4</b>	<b>21.95</b>	<b>2018.1</b>

Component 2: New industrial infrastructure required for expansion	Kanpur-Auraiya	Agra-Aligarh	Allahabad-Varanasi	Total (Rs. Crore)
Leather and leather goods, Kanpur & Unnao	3,628			3,628
Plastic packaging, Kanpur	473			473
Hosiery garments, Kanpur				-
Chikankari, Lucknow	1,562			1,562
Perfume fragrance, Kannauj	30			30
Footwear, Agra		1,038		1,038
Foundry & light engineering, Agra		94		94
Glassware, Firozabad		127		127
Lock and light engineering, Aligarh		182		182
Flour, dairy and meat, Aligarh		259		259
Silk cluster, Varansi			4,918	4,918
<b>Total Component 2</b>	<b>5,693</b>	<b>1,700</b>	<b>4,918</b>	<b>12,311</b>
<b>Total Component 2 (US Dollars Million)</b>	<b>912.36</b>	<b>272.46</b>	<b>788.22</b>	<b>1973.16</b>

Component 3. Sub-regional infrastructure	Total Length (km.)	Project Cost (Rs. Crore)
Inner Ring Road, Kanpur	65	520
Outer Ring Road, Kanpur	105	840
Inner Ring Road, Agra	45	360
Outer Ring Road, Agra	50	400
Inner Ring Road, Varanasi	30	240
Outer Ring Road, Varanasi	60	480
Outer Ring Road, Aligarh	30	240
Connecting Roads with Ring Roads	65	520
Total Ring Roads	450	3,600
Raw water rising from main from permanent source	130	65
Upgrading of power distribution for Kanpur	Lumpsum	1,040
Soft component (technical assistance)	Lumpsum	110
<b>Total Component 3</b>		<b>4,815</b>
<b>Total Component 3 (US Dollars Million)</b>		<b>771.7</b>

# ANNEX 3. INVESTMENT PRIORITIZATION FOR SUB-REGIONS

## A. Kanpur-Auraiya Sub-Region

Priority	Project	0-6 Months	6-12 Months	1-2 Years	2-3 Years	3-6 Years	6-9 Years	Investment (Rs. Crore)	Lead/Main Implementing Agency(ies)
1	Soft assistance to five industrial clusters							50	UPSIDC
2	Augmenting infrastructure in existing industrial areas							331.8	UPSIDC
3	Redevelopment of Jajmau industrial area							586.5	UPSIDC, Kanpur Nagar Nigam
4	Development of inner and outer ring roads in Kanpur							1,589.7	National Highways Authority of India (NHAI)
5	Upgrading the power distribution network for power in Kanpur							1,040	Kanpur Electricity Supply Company
6	Public transport system connecting to industrial areas							TBD	Kanpur Metropolitan Bus Service, Uttar Pradesh State Road Transport Corporation
7	Raw water rising main from permanent source							30	Uttar Pradesh Jal Nigam, UPSIDC
8	Piloting the development of new industrial areas							TBD*	UPSIDC
9	Upgrading the Chakeri Airport in Kanpur							TBD	Airport Authority of India

Priority	Project	0-6 Months	6-12 Months	1-2 Years	2-3 Years	3-6 Years	6-9 Years	Investment (Rs. Crore)	Lead/Main Implementing Agency(ies)
10	Development of new industrial infrastructure							569.3	UPSIDC
11	Relocation of ICD near AKIC stations							TBD	UPSIDC
<b>Total</b>								<b>4,197.3</b>	
<b>Total (US Dollars million)</b>								<b>672.8</b>	

TBD To be determined through separate technical studies.

TBD\* To be determined for the industrial areas that have already planned for development and for which UPIDC already secured land.

	Project Preparation
	Project Implementation

## B. Agra-Aligarh Sub-Region

Priority	Project	0-6 Months	6-12 Months	1-2 Years	2-3 Years	3-6 Years	6-9 Years	Investment (Rs. Crore)	Lead/Main Implementing Agency(ies)
1	Soft assistance to five industrial clusters							50	UPSIDC
2	Augmenting infrastructure in existing industrial areas							327.2	UPSIDC
3	Development of inner and outer ring roads in Agra							888.3	National Highways Authority of India (NHAI)
4	Development of outer ring roads in Aligarh							280.5	Housing and Urban Planning Department, Government of Uttar Pradesh
5	Development of ring road in Firozabad							TBD	Housing and Urban Planning Department, Government of Uttar Pradesh
6	Upgrading the power distribution network							TBD	Dakshinanchal Vidyut Vitran Nigam Limited
7	Public transport system connecting to industrial areas							TBD	Uttar Pradesh State Road Transport Corporation
8	Raw water rising main from permanent source							35	Uttar Pradesh Jal Nigam, UPSIDC

Priority	Project	0-6 Months	6-12 Months	1-2 Years	2-3 Years	3-6 Years	6-9 Years	Investment (Rs. Crore)	Lead/Main Implementing Agency(ies)
9	Piloting the development of new industrial areas							TBD*	UPSIDC
10	Development of new industrial infrastructure							170	UPSIDC
11	Relocation of ICD near AKIC stations							TBD	UPSIDC
<b>Total</b>								<b>1,751</b>	
<b>Total (US Dollars million)</b>								<b>230.04</b>	

TBD To be determined through separate technical studies.

TBD\* To be determined for the industrial areas that have already planned for development and for which UPIDC already secured land.

	Project Preparation
	Project Implementation

### C. Allahabad-Varanasi Sub-Region

Priority	Project	0-6 Months	6-12 Months	1-2 Years	2-3 Years	3-6 Years	6-9 Years	Investment (Rs. Crore)	Lead/Main Implementing Agency(ies)
1	Soft assistance to silk cluster in Varanasi							10	UPSIDC
2	Augmenting infrastructure in existing industrial areas							13.7	UPSIDC
3	Development of inner and outer ring roads in Varanasi							841.5	National Highways Authority of India (NHAI)
4	Upgrading the power distribution network							TBD	Purvanchal Vidyut Vitaran Nigam Limited
5	Public transport system connecting to industrial areas							TBD	Uttar Pradesh State Road Transport Corporation
6	Piloting the development of new industrial areas							TBD*	UPSIDC
7	Development of new industrial infrastructure							491.8	UPSIDC
<b>Total</b>								<b>1,357</b>	
<b>Total (US Dollars Million)</b>								<b>220</b>	

TBD To be determined through separate technical studies.

TBD\* To be determined for the industrial areas that have already planned for development and for which UPIDC already secured land.

	Project Preparation
	Project Implementation







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