



TECHNICAL PAPER 2

INDUSTRIAL DEVELOPMENT



2 INDUSTRIAL DEVELOPMENT

2.1 PRESENT DYNAMICS IN THE LANDSCAPE OF PUNJAB

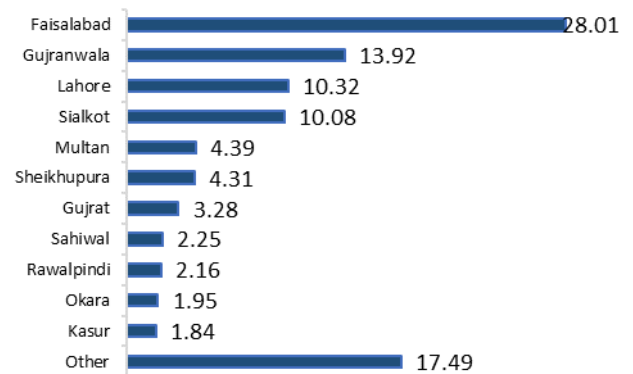
2.1.1 Background

The share of Punjab's agriculture sector towards the GDP has reduced as the services sector has seen significant growth since the advent of the new millennium. The economic contribution of industrial sector has remained stagnant over the years. According to latest statistics reported in the Punjab Economic Report (2017) the contribution of Punjab's industrial sector to province GDP stands at 22% in 2015-16. Of this 22%, majority of the industries in the province are agro-based and are dependent on the province's agricultural linkages. These industries include textiles, wearing apparel and food products. The industrial sector of Punjab currently employs a meagrely 24% of the total workforce. As shown in Figure 2.1, since Pakistan's independence, despite the modest increase in overall share of the industrial sector in the economy, the manufacturing sector has experienced a declining trend.

2.1.2 Spatial and Sectorial Distribution

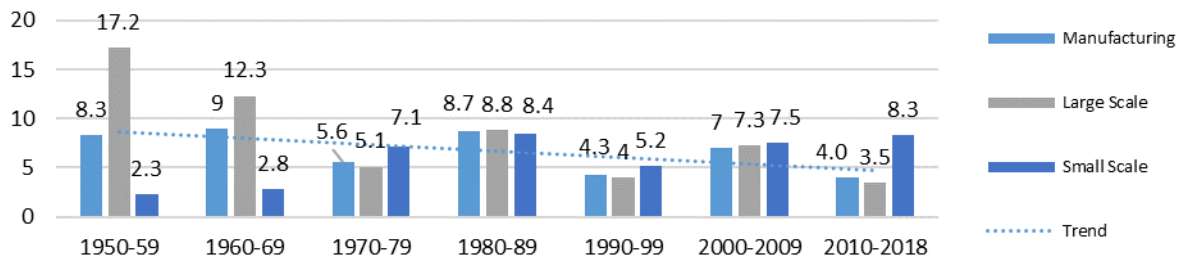
Figure 2.2 depicts the percentage of manufacturing firms in the districts of Punjab. Faisalabad, Gujranwala, Lahore and Sialkot are the major industrial hubs of the province. CMI 2015-16 shows that top eleven district of Punjab, covering 20% of total Punjab's area, house 83% of its industry out of 46,357 industrial units. In terms of employment share, Faisalabad remains on top, however, Lahore is on number second followed by Gujranwala and Sialkot.

Figure 2.2 Percentages of total industrial units in districts of Punjab



Source: Census of Manufacturing Industries 2015-16

Figure 2.1 Decade-wise growth rate of manufacturing sector 1950-2018¹

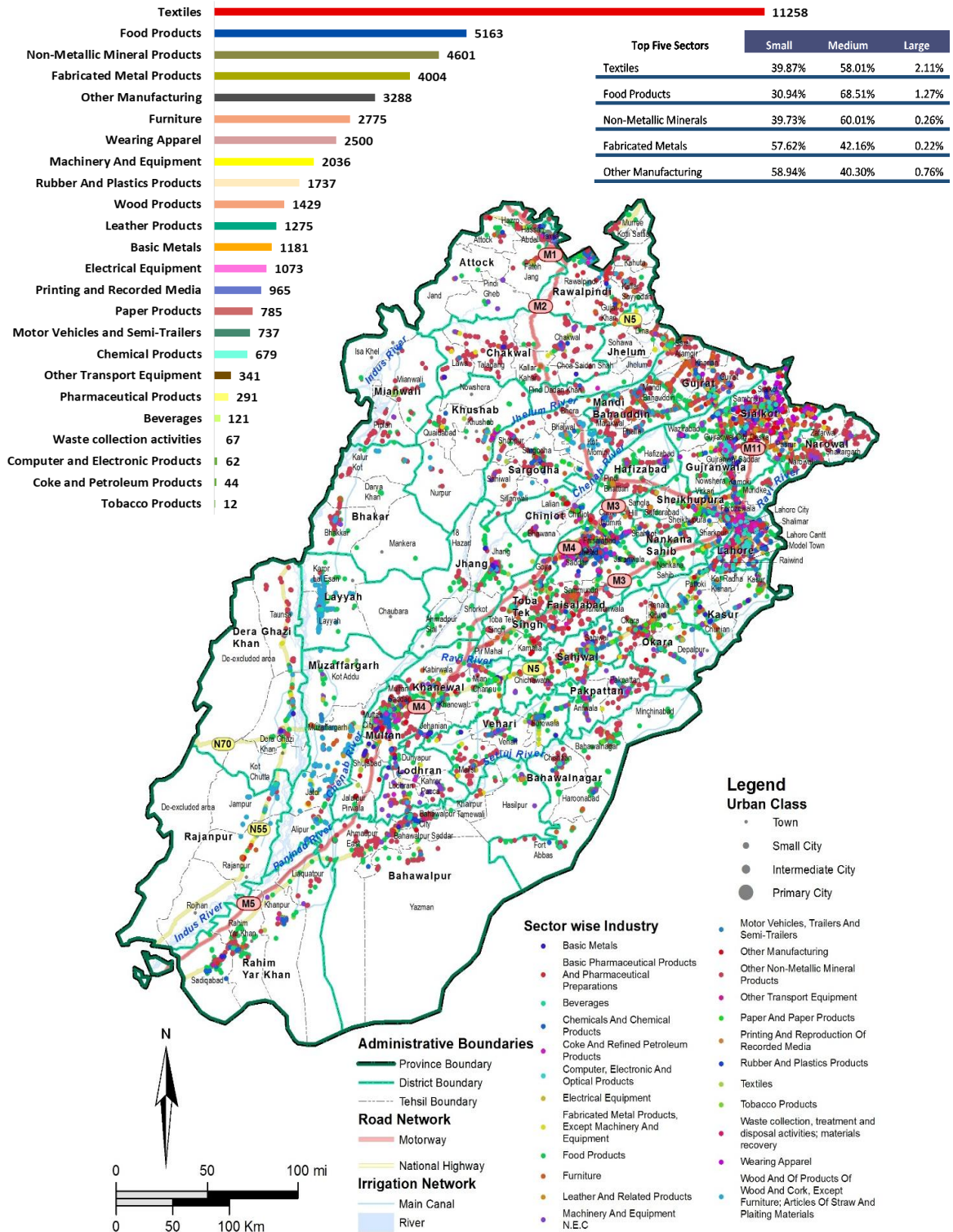


Source: Government of Pakistan (2017). "Pakistan Economic Survey 2017-18

¹ Bifurcation of Small, Medium and Large firms is based on number of employees, as follows: (Small: 0-10) (Medium: 10-250) (Large: >250)



Figure 2.3 Sector-wise spatial distribution of industries



Source: Urban Unit



While looking into sectoral composition, Figure 2.3 depicts the spatial location of manufacturing firms in Punjab. The highest number of manufacturing firms in the province belongs to the textiles sector, which includes spinning, weaving and finishing firms.

Based on the concentration, diversification, operationalization and intensity location quotients calculated using data from CMI 2015-16, Table 2.1 shows the key products manufactured in the major industrial hubs of Punjab. The most significant products manufactured in the province belong to the textiles sector, which includes spinning, weaving and finishing firms. This is followed by food products, which include firms associated with dairy products, grain mills, animal feed and vegetable oil.

Table 2.1 Existing key products in major districts of Punjab

Faisalabad	<ul style="list-style-type: none"> •Finishing Of Textiles •Weaving Of Textiles •Made-Up Textile Articles, Except Apparel •Other Textiles •Knitted And Crocheted Apparel •Knitted And Crocheted Fabrics •Cordage, Rope, Twine And Netting
Gujranwala	<ul style="list-style-type: none"> •Electric Motors, Generators, Transformers •Domestic Appliances •Other Pumps, Compressors, Taps And Valves •Forging, Pressing, Stamping And Roll-Forming Of Metal; Powder Metallurgy •Other Fabricated Metal Products
Lahore	<ul style="list-style-type: none"> •Parts And Accessories For Motor Vehicles •Pharmaceuticals, Medicinal Chemical And •Other Electronic And Electric Wires And Cables •Electric Motors, Generators, Transformers •Wearing Apparel, Except Fur Apparel
Sialkot	<ul style="list-style-type: none"> •Sports Ods •Tanning And Dressing Of Leather; Dressing And Dyeing Of Fur •Wearing Apparel, Except Fur Apparel •Cutlery, Hand Tools And General Hardware •Medical And Dental Instruments And Supplies •Other Manufacturing

Multan	<ul style="list-style-type: none"> •Finishing Of Textiles •Made-Up Textile Articles, Except Apparel •Pesticides And Other Agrochemical Products •Preparation And Spinning Of Textile Fibers •Wearing Apparel, Except Fur Apparel •Corrugated Paper And Paperboard And Of Containers Of Paper And Paper Board
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Source: Census of Manufacturing Industries 2015-16

2.1.3 Industrial Agglomeration

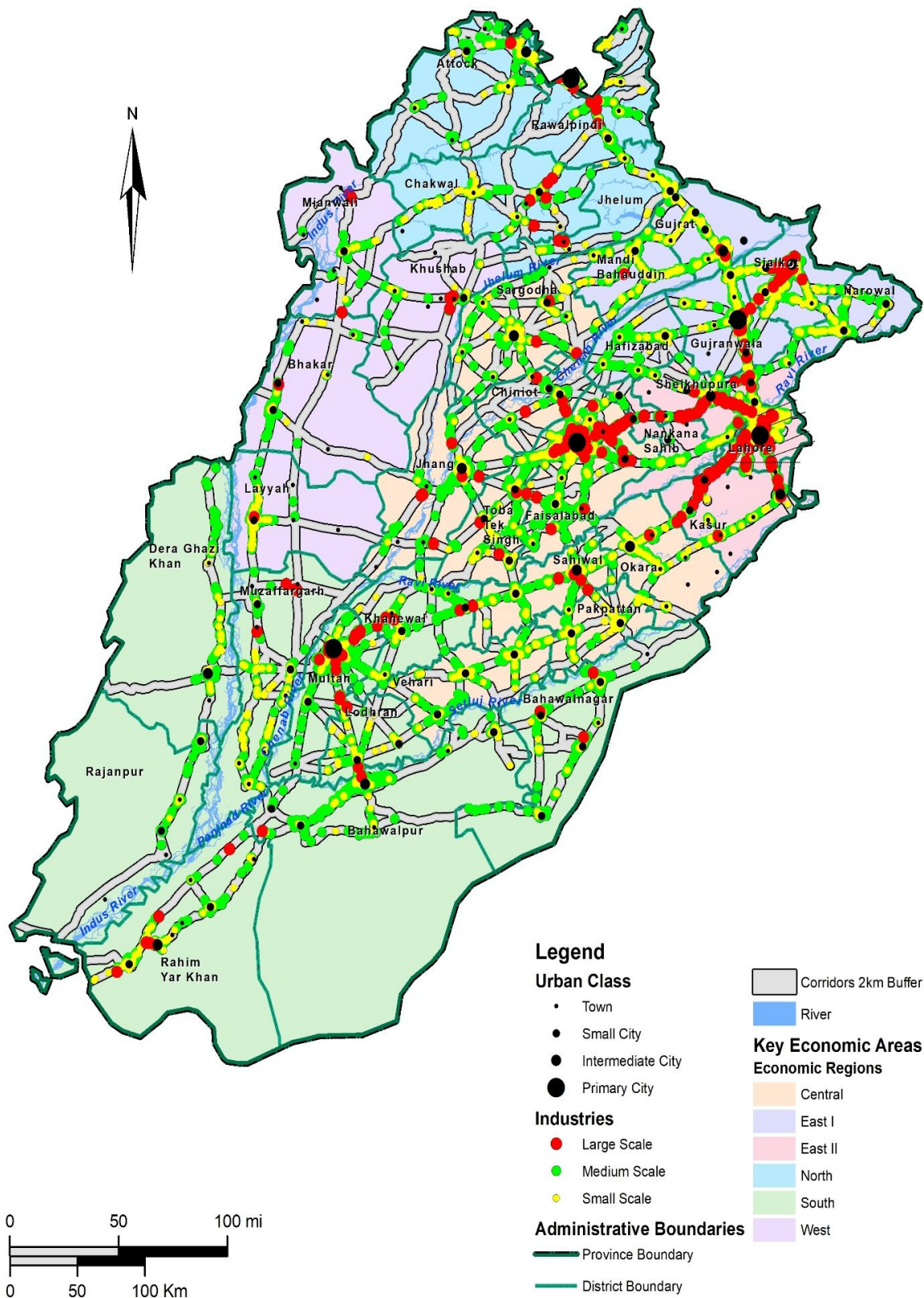
Agglomeration economies and the causal formation of industrial corridors and clusters have played an important role in industrial development of Punjab. The sectors which have developed in the form of natural clusters, although being few in numbers, have experienced high growth rates in past and have been able to take advantage of agglomeration economies.

Industrial Corridors

Most of the industrial development in Punjab has been supported by road infrastructure. For instance, Figure 2.4 depicts that most of the industries (more than 95%) are located within 2 km of the major roads and highways in Punjab. This trend shows strong trading linkages with industry requirements for an easy access to raw materials and markets. The central and eastern parts of the province containing districts such as Lahore, Faisalabad and Gujranwala have a higher density of major roads and highways and therefore have a higher concentration of industry. However, major road corridors are still vacant or have a low density. These corridors can be developed on the same lines as SEZs to form high value agglomerated corridors.



Figure 2.4 Industries on the major road network



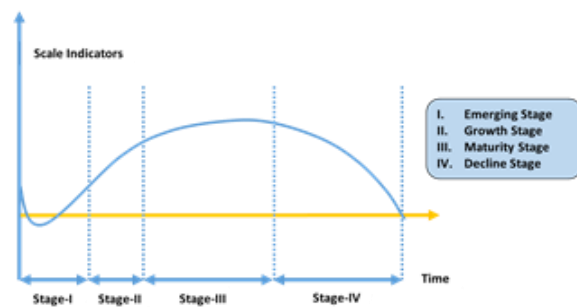
Source: Census of Manufacturing Industries 2015-16



Industrial Clusters

Industrial clustering is a very popular phenomenon described as the co-existence of complementing or competing firms, with shared resources, in close vicinity which gives rise to agglomeration economies. Punjab has been able to grow few clusters supported by historical and traditional linkages. Table 2.2 shows an estimated attribution of cluster lifecycle stages to the major agglomerated broader sectors of Punjab. Attribution has been done on the basis of concentration of the clusters calculated through the Ellison Glaser Index and number of firms in the cluster².

Figure 2.5 Stages of cluster development



Source: Gong, Jin & Wang, 2008³

Table 2.2 Cluster profile of Punjab's industrial sectors

Broad Sectors	Cluster Stage
Tobacco Products	Emerging
Computer, Electronic And Optical	Emerging
Basic Pharmaceutical Products	Emerging
Other Transport Equipment	Emerging
Electrical Equipment	Growing
Motor Vehicles, Trailers	Growing
Basic Metals	Growing
Wood And Of Products Of Wood	Growing
Leather And Related Products	Growing
Other Manufacturing	Sustaining
Fabricated Metal Products	Sustaining
Wearing Apparel	Declining
Textiles	Declining
Rubber And Plastics Products	Declining
Other Non-Metallic Mineral	Declining

Source: CMI 2015-16, Authors own calculations

There are several emerging clusters in Punjab, which currently comprise only a small number of firms but show promising prospects for reshaping into larger and competitive ones. The growing clusters on the other hand, have a significantly higher number of firms and an intermediate level of concentration. Similarly, the two major sustaining clusters are characterized by higher

² Annexure I shows the calculation of EGI for the clusters of Punjab

³ Gong, J. L., Jin, R. W., & Wang, F. R. (2008). Study on the life cycle of regional industrial clusters. Economic Tribune, 23, 4-7

concentration and a high number of firms. The declining clusters such as wearing apparel and textiles have a high number of firms but lower concentration owing to the high rate of firm closure in these clusters.

The top four industrial districts house 62.42% of Punjab's overall industry and representing various value chains. Industrial clusters located in Faisalabad and Sialkot are highly export-oriented whereas, clusters in Lahore and Gujranwala are predominantly inward-focused. The major and minor clusters in the industrial districts of Punjab are depicted in Table 2.3.

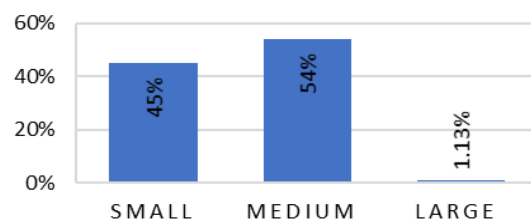
Table 2.3 Industrial clustering in major districts of Punjab

District	Major Clusters	Smaller Clusters
Faisalabad	Wearing Apparel Textiles	Fabricated Metal Products
Lahore	Wearing Apparel Textiles	Food Products Fabricated Metal Products
Sialkot	Sports goods Surgical equipment Wearing Apparel	Fabricated Metal Products Leather Products
Gujranwala	Electrical appliances Fabricated Metal Products Wearing Apparel	Food Products Textiles
Multan		Textiles Wearing Apparel Food Products

Source: Census of Manufacturing Industries 2015-16

For overall Punjab, Figure 2.6 depicts the agglomeration of manufacturing industries in Punjab based on CMI 2015-16 spatial data. The regions in dark red show a high concentration of firms located in proximity to each other. The manufacturing firms in major industrial hubs such as Faisalabad, Sialkot, Lahore, Gujranwala and Multan fall in the highly agglomerated category. The smaller clusters indicated in purple exist mainly in the districts of Attock and Rawalpindi. Other smaller clusters indicated in blue are scattered all over Punjab. Currently, only 1.13% of the manufacturing industries in Punjab are large-scale whereas the medium scale industries have the maximum share as depicted in Figure 2.5 below.

Figure 2.5 Scale-wise manufacturing industries



Source: Census of Manufacturing Industries 2015-16

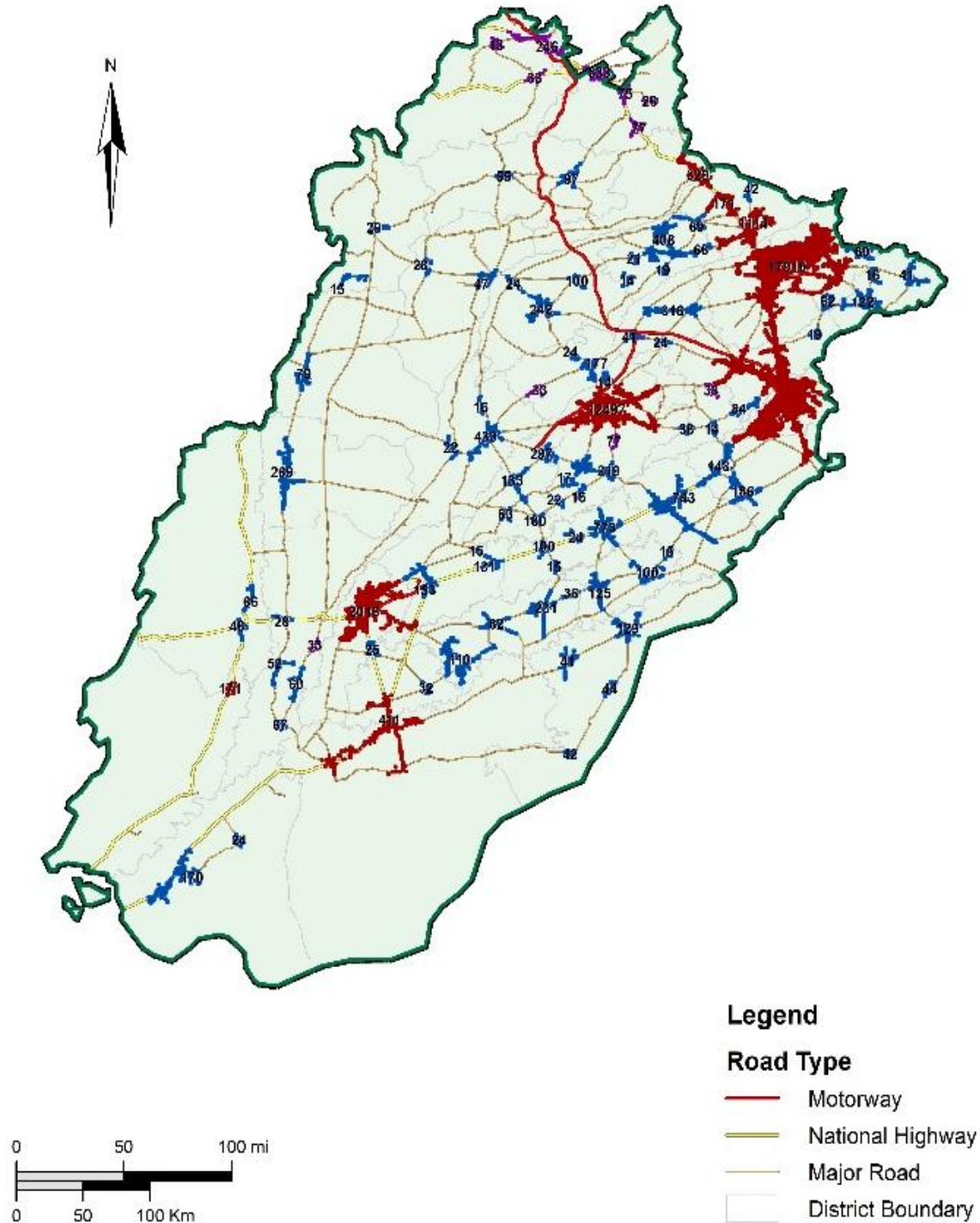


A major reason for the higher percentage of small and medium firms is the lack of investment capital available within the private sector. Low incomes, low propensity to save and non-availability of credit contribute to the lack of investment capital. This, coupled with sub-par competitiveness of Punjab also does not allow firms to expand.

Clusters and Urban Punjab

CMI 2015-16 exhibited that nearly 80% of industry in Punjab was either in the city boundary or near it. All major industrial clusters as depicted in Table 2.3 are within major urban centers. To enhance and promote the phenomenon of clustering and agglomeration in Punjab, urban centers will have to be made more competitive and enabling for industrialization.

Figure 2.6 Industrial concentration areas



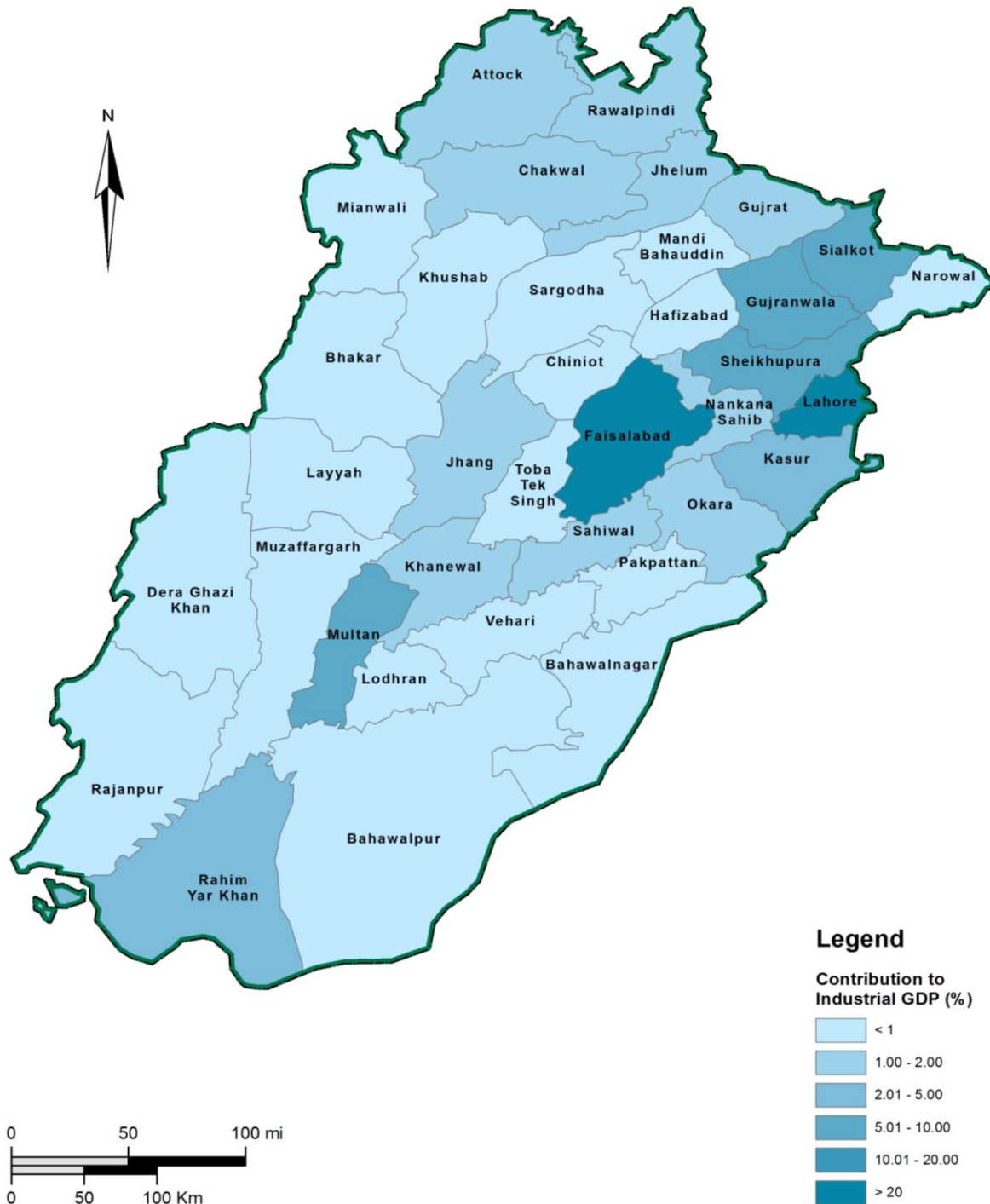
Source: Census of Manufacturing Industries 2015-16



To measure the concentration and economic contribution in a more dynamic way, Figure 2.7 reflects district-wise percentage contribution to the industrial GDP of Punjab. Firms in Faisalabad and Lahore have the highest GDP contribution. The Local development framework needs to cater to these high density and high value-adding districts to viably determine the balance between urban settlements and industries, without compromising on industrial productivity as well as human settlements.

The industrial sector of Punjab has been uncompetitive in comparison to regional peers despite the existence of industrial clusters. This is particularly due to suboptimal location decisions which cause a haphazard distribution of industrial sectors and prevent clustering. Further, dearth of sector specific knowledge, low innovation and technology and non-cooperation between firms leads to insignificant agglomeration.

Figure 2.7 District-wise percentage contributions to industrial GDP of Punjab



Source: Census of Manufacturing Industries 2015-16



Industrial Estates and Special Economic Zones

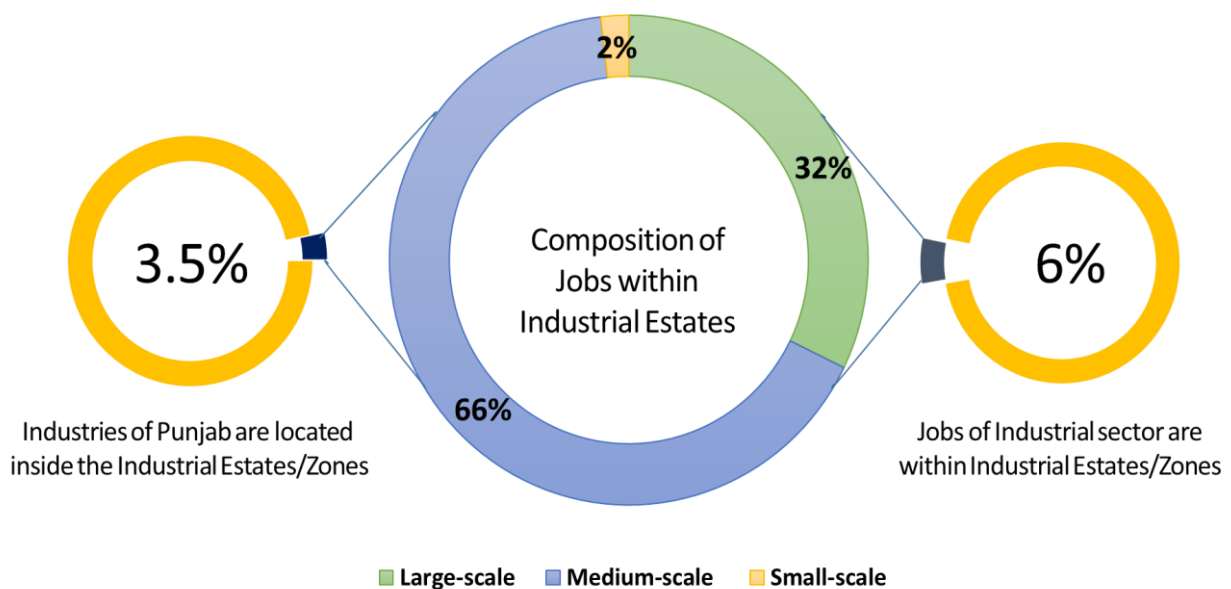
To support and bolster the industrial sector of Punjab, the Federal and Punjab government initiated industrial estates in the province to provide industrialists with a focused area of supportive amenities and other incentives. One of the first large industrial estate established in 1960 was the Quaid-e-Azam Industrial Estate in Lahore. Currently, 100% of the plots in the estate are sold and 90% of them are colonized by industries. Similarly, the first phase of Multan industrial estate established in 1980 is 100% colonized. Along with the large industrial estates, smaller ones were also established under Punjab Small Industries Corporation. Industrial estates under PSIC were first established in Lahore, Sialkot, Gujranwala, Gujrat, Sheikhupura and Bahawalpur in the 1960's. Similarly, SEZs in Sheikhupura and Faisalabad and Export processing zones have also been recently developed. The industrial estates have played a certain role in the agglomeration of industries however, as shown in Figure 2.8, currently only 3.5% of the industries in Punjab are located in industrial estates and SEZs which indicates that the full potential of these estates has not yet been realized. The case of Rachna industrial estate (refer to Figure 2.11) indicates that the suboptimal locations of these estates outside of already existing corridors is the main reason for the low occupation of industrial estates and SEZs.

The Industrial estates and SEZs established in the industrial hubs of Punjab such as Lahore, Faisalabad and Multan have experienced greater success than those established in non-industrial districts such as the Vehari industrial estate. This emphasizes the key role of spatial planning in the location of Industrial estates.

Below is a summary of the key issues facing Industrial Estates and SEZs:

- Non-optimal location of Industrial estates and SEZs due to lack of evidence based spatial planning.
- Difficulty in obtaining electricity and gas connections.
- Non-availability of gas in several of the industrial estates/SEZs and electricity load shedding.
- Higher land prices within the industrial estates than outside in the same vicinity.
- Absence of land leasing mechanism coupled with no rental instruments for plug-and-play investments.
- Purchase of plots by real estate agents to sell at higher prices in future drives up the cost of plots due to which industrialists may choose to locate outside the estate.
- Absence of an effective one-window facility for investor facilitation within the estates.
- The lack of skilled labor in proximity to the estates prevent the agglomeration of high-technology industries.

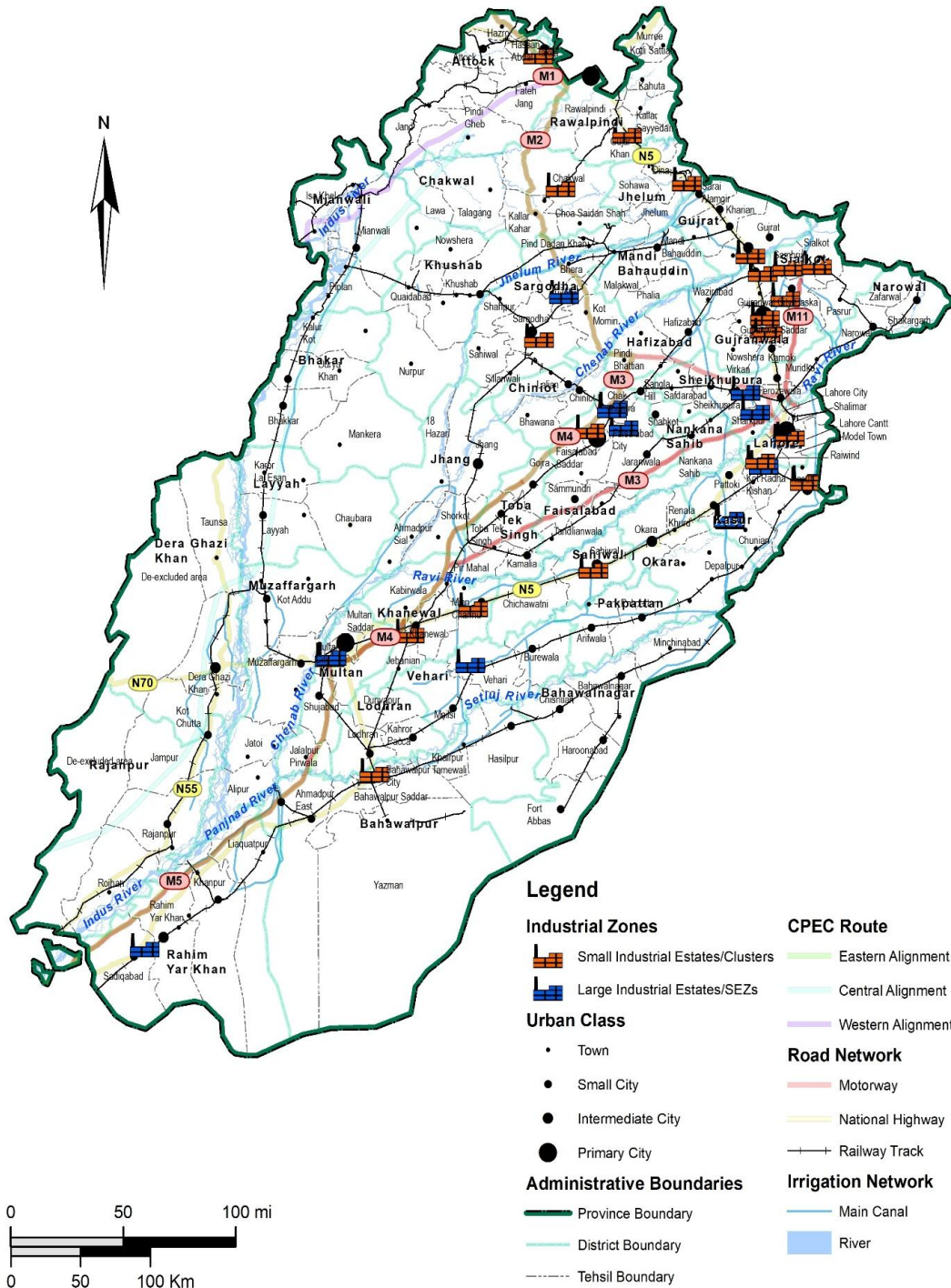
Figure 2.8 Compositions of industrial estates in Punjab



Source: Census of Manufacturing Industries 2015-16



Figure 2.9 Industrial estates and zones



Source: Census of Manufacturing Industries 2015-16



Currently there are nine large industrial estates under PIEDMC, three of which are under development. Similarly, two of the four large industrial estate under FIEDMC are under development. PSIC (Punjab Small Industries Corporation) has until now developed twenty small industrial estates and another in Lahore is under development. Figure 2.9 outlines the industrial estates' locations across Punjab with representation of small industrial estates being managed by PSIC and large industrial estates/ SEZs are under PIEDMC, FIEDMC and NIP.

2.1.4 International Linkages

Despite transitioning in early 1960's, the industrial sector of Punjab is still inward focused and not expanding in international markets. Four out of the five major clusters are around Punjab's largest cities (except Rawalpindi) i.e., Lahore, Faisalabad, Multan and Sialkot. The Golden Triangle of Punjab is the major exporting hub along Faisalabad. These areas account for nearly 91% of exporting firms in Punjab. However, the number of exporting firms is substantially low (nearly 5% of total manufacturing firms), as nearly all of the firms are catering to domestic demand.

The major export oriented clusters in Punjab are depicted in Table 5.4.

Table 2.4 Major export clusters in Punjab

District	Major Export Clusters
Sialkot	Wearing Apparel, Medical and dental instruments, Sports, Cutlery hand tools and general hardware
Faisalabad	Wearing Apparel, Textile weaving and finishing,
Lahore	Wearing Apparel
Gujranwala	Cutlery hand tools and general hardware, Other fabricated metal products

Source: Census of Manufacturing Industries 2015-16

As depicted in the Table 2.5, CMI 2015-16 data reveals that USA is the export destination of 29% of export reporting firms in Punjab. Germany is on second followed by Virgin Islands and UAE. While in case of imports of raw materials, China is leading with almost 50% share in Raw material imports followed by India, Albania and USA. Our imports from China account for 50% of our total imports while only 2.45% is exported back to China as a finished goods. A long-term plan is urgently needed for all the industrial sectors to improve

exports and for the consistent growth of export industry.

Table 2.5 Global industrial linkages for Punjab's industrial sector

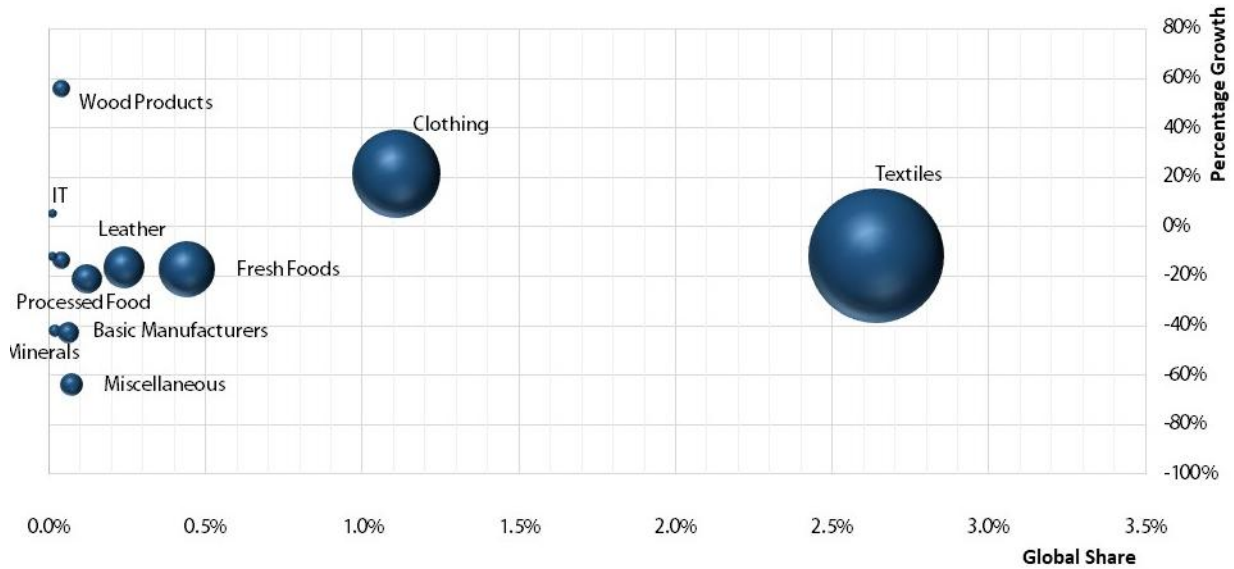
DESTINATION OF EXPORTING INDUSTRIES		IMPORT ORIGIN FOR IMPORTING INDUSTRIES	
Country	Percent	Country	Percent
USA	29.11%	China	49.78%
Germany	13.88%	India	4.98%
UK	7.01%	Albania	4.55%
UAE	4.91%	USA	3.68%
Italy	4.26%	Saudi Arabia	3.46%
Australia	3.51%	UAE	3.25%
Saudi Arabia	3.01%	Germany	2.60%
France	2.96%	Italy	1.95%
China	2.45%	Japan	1.95%
Canada	2.25%	Algeria	1.73%

Source: Census of Manufacturing Industries 2015-16

Over the past five years, Pakistan's exports, in terms of value, have dwindled by over 16%. Figure 2.10 below shows the growth in value of the export sectors on the X-axis plotted against their global market share on the Y-axis over the past five years. The bubble size shows the exported value over the past five years. With a global market share of 1.11% and a growth in value of around 21%, the clothing sector has been Pakistan's most competitive sector over the past 5 years. This however pales in comparison to other regional economies like Bangladesh. Bangladesh's clothing sector has shown remarkable growth in the past five years with its exports value increasing by over 47%. Bangladesh's clothing sector commands 5.6% of the global market share.



Figure 2.10 Declining exports' competitiveness of Pakistan



Source: International Trade Center, 2016

The objective of industrial strategy for Punjab should be to achieve a positive growth for all sectors through an increase in the global share of exports. Using CPEC as a window of opportunity, in order to make Punjab's industry more competitive from a global perspective, we should make efforts for the relocation of China's export producing firms, with already existing global markets, to Punjab. Capturing even a small share of China's exports will enable Punjab to greatly expand and diversify its export market.

2.2 CHALLENGES AND PROSPECTS FOR GROWTH

2.2.1 Integrated Development with Spatial Lens

Optimum development cannot be achieved without integrated spatial development. Punjab is also facing inordinate planning regime which is largely influenced by political corners. For instance, the location of several industrial estates and SEZs had not been done through an evidence-based mechanism. This is resulting in haphazard industrial growth outside the demarcated industrial zones despite vacant spaces within the zones. The location of estates is not optimal for industrialization due to either the lack of proper infrastructure, institutions, labor, materials, utilities or markets. Establishing industrial estates in districts with low industrialization and lack of basic infrastructure and facilities, such as the case of Vehari Industrial estate, is not prudent from an investment point of view. Similarly, overall, industrial sectors are scattered due to asymmetry of information regarding optimal locations for development of specific sectors. This prevents the formation of effective, knowledge based clusters in the

province. Punjab's Policy to develop an industrial estate in every district is neither a practical nor a prudent approach.

The inclusion of evidence-based planning for the industrial sector in Punjab, the Spatial Strategy will allow the development and growth of high potential areas on priority instead of investing in low potential areas. Through systematic investments, if the high potential areas are provided with proper infrastructure, connectivity and other amenities, the success rates of the industrial zones in those areas will be much higher to support the backward areas of the province in later stages.

Another example of the non-optimized industrial development is the inordinate corridors development framework. For instance, if we select one of the major industrial corridors in Punjab, the Lahore-to-Shiekhupura road and demarcate a 2-kilometer buffer around it, the result becomes very encouraging and surprising at the same time. On a 24-kilometer selected corridor, starting from Kotab Abdul Malik to Shiekhupura bypass, there is not a single industry reported outside the corridor as demarcated with 2-Kilometer buffer. This put a very strong rationale that the development of industrial spaces along the corridors is very important. Still 78% of The Lahore-Shiekhupura Industrial corridor is not developed out of which above 15% area is not used for any purposes (barren land), and area being used for Agriculture purposes represents 80% of the total area.

As shown in Figure 2.11, however, the government has experimented to develop an industrial zone, Rachna Industrial Park, at the distance of above 8-Kilometers away from the main corridor which has caused new

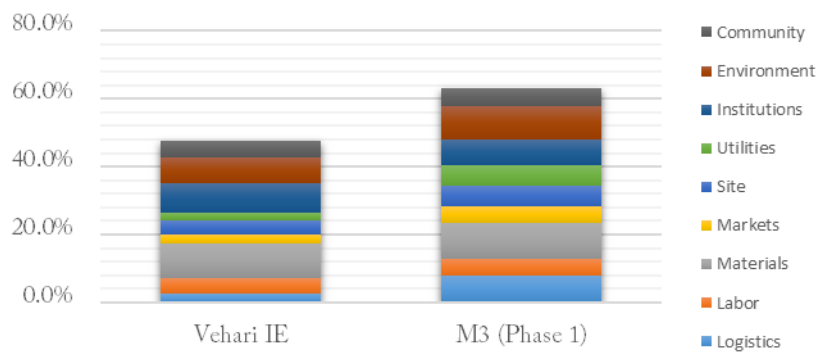


public investments for road infrastructure and other ancillary developments. Now the Industrial park is facing challenges to attract investments as the site is not optimally located thus it will take excessive efforts and duration in making the zone fully operational. There is also a strong possibility that the opportunity cost of developing such an inappropriate zone may exceed the economic trade-off.

BOX 2.1 Importance of Spatial Planning in Location Decisions- A Case of Industrial Estates in Faisalabad and Vehari

A comparative analysis of the M-3 (Phase-1) industrial estate in Faisalabad and the Vehari industrial estate highlights the importance of incorporating optimal, evidence based site selection for future industrial estates and SEZs. Faisalabad is a major industrial hub of Punjab with set local and international industrial linkages, Vehari on the other hand is a backward district with very limited infrastructural development and industrial appetite.

INDUSTRIAL ESTATE LOCATION SCORES



Based on a detailed framework, incorporating 42 distinct indicators, developed for scoring the major industrial estates in Punjab, the figure above depicts a summary of the dimensional and overall score received by both the industrial estates while the respective sale and colonization percentage are depicted in Table 2.6.

INDUSTRIAL ESTATE COLONIZATION AND SALE PERCENTAGE

Industrial Estate	Colonization %	Sale %
M3 (Phase 1)	28	80
Vehari	0	0

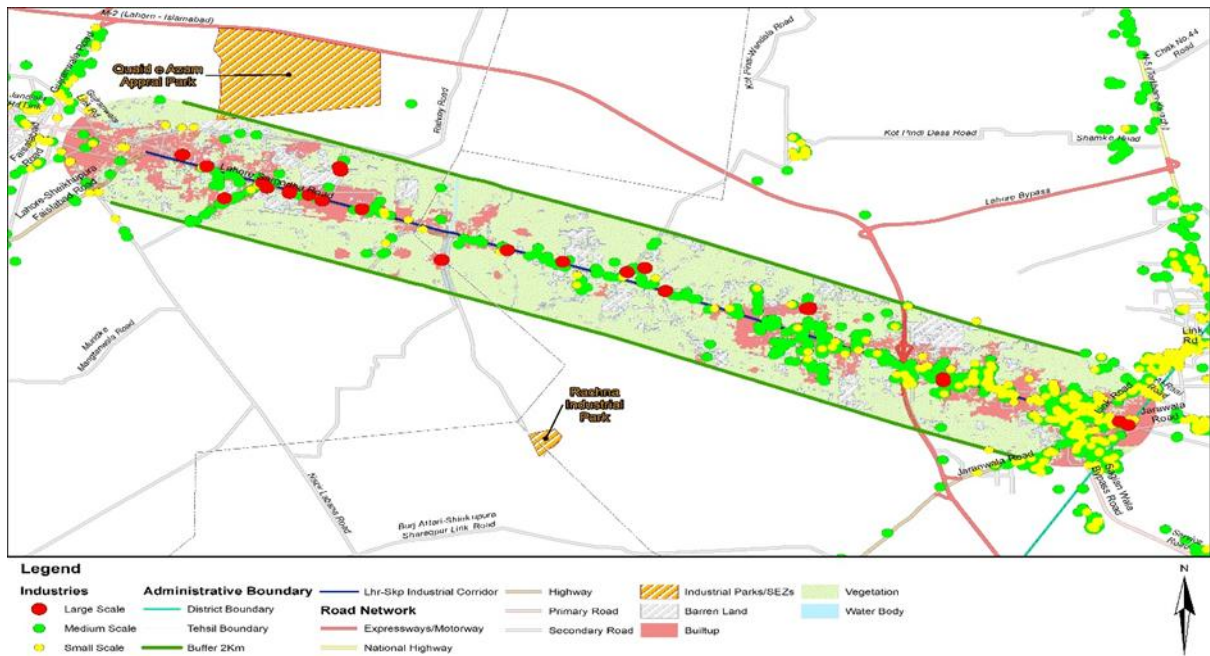
The Faisalabad industrial estate has received considerably better scores in logistics, accessibility to sufficient markets and utilities availability, all of which are key dimensions for the industries to be located in these industrial estates. An evaluation of the corresponding sale and colonization percentage reveals the true impact of site optimality on the private sectors decision to locate their industry in these estates.

In comparison to M3 industrial estate which has been developed recently with Vehari industrial estate that has been there for around a decade and caused considerable public expenditure has failed to attract the industrial sector which signifies the importance of evidence based site selection to prevent further misspending on low impact projects.

Source: Authors own calculations



Figure 2.11 Lahore-Sheikhupura industrial corridor



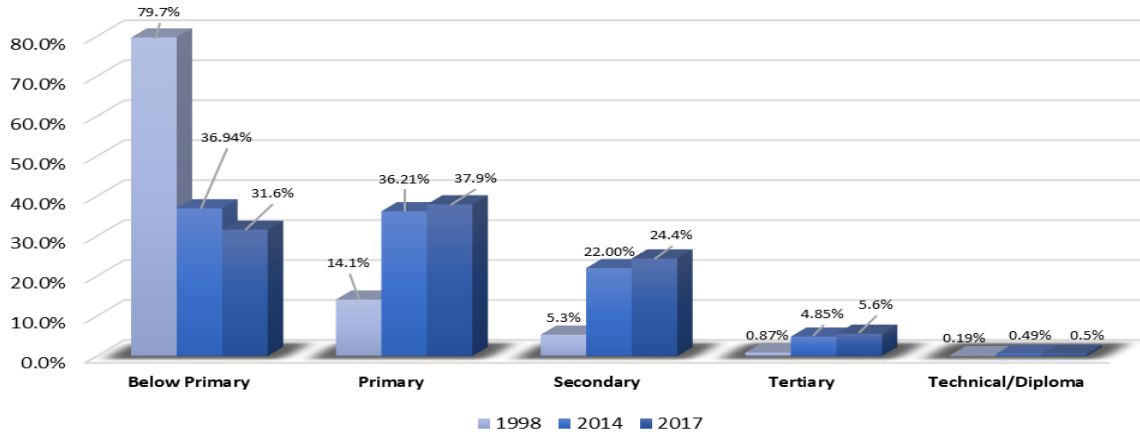
Source: Census of Manufacturing Industries 2015-16 and Urban Unit



2.2.2 Human Capital

The human capital of Punjab, largely without having appropriate skillset, is one of the critical factors hindering the progress of industrial sector in Punjab. Although the low cost of labor is the key advantage Punjab has in comparison to other more developed economics like China; however, in the absence of an

Figure 2.12 Changing education portfolio of Punjab



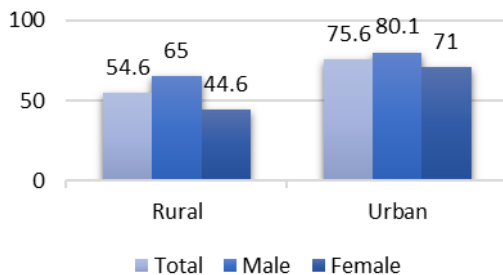
Sources: Population Census 1998 and various issues of PSLM

effective skill and capacity development mechanism for the laborforce, Punjab cannot leverage its endowments for achieving high value added industrial development. Present Pakistan, influenced largely by Punjab, is on the nadir in international rankings featuring human characteristics i.e. Global Human Capital index, Human Development Index etc.

The labor force of Pakistan is trained mostly for non-technical, low innovation industries such as the textile and apparel sectors. To attract foreign investment and capture relocation of global labor intensive industries from China in particular, it is essential to improve the productivity of the labor force through focused and accessible training.

Education Snapshots

Figure 2.13 Punjab literacy ratio (aged 10 and above)



Source: Punjab Development Survey 2017

To develop a compatible human capital of Punjab, policy intervention for skill matching and filling-in the gap between the demand and supply of human capital is

needed. Many of today's education systems are disconnected from the skills needed to function in today's labor markets and are not suited to current or future labor markets which is further widening the gap between supply from educational institutes and demand by the labor markets.

Table 2.6 Universities and technical institutes in Punjab

Punjab	Numbers	Enrolments
Universities	57	131727
TEVTA Centres	129	23313

Sources: HEC and TEVTA

Most of the universities programs are neither futuristic nor providing enough high-skilled graduates to meet the potential demand arising from CPEC and expected policy implications. Currently standing at 5.6%, Punjab has a very low tertiary education ratio. This, in part, is due to the limited infrastructure of higher education in the province as depicted in Table 2.6. Additionally, the operative scale of the institutions responsible for imparting technical and vocational skills such as TEVTA, are not adequate to meet future demand. The skill enhancement trainings are based on obsolete and inefficient technology. The trainings offered are mostly supply driven instead of being demand driven and the skills imparted to the labor are of little practical use in the industry. It is necessary to implement capacity building measures in these institutions and bring about structural change to be able to reap the benefits of the lower cost of labor in Punjab.



China's local governments have played a proactive role in building research institutes and upgrading technological centers to improve learning support programs and enhance capabilities of the youth. For instance, with every existing industry in China, there is a research center affiliated, offering relevant support to the sectors growth. To name a few, for Iron and Steel Industry, the country has "China Iron & Steel Research Institute Group Co., Ltd.". Developing countries like Pakistan can minimize skill mismatch by placing a higher emphasis towards tertiary and vocational education along with investments in research targeting industry related disciplines.

As an example, Gujranwala's industrial sector is currently facing the issue of inadequate skills and a mismatch of skillset which is hindering industrial development in the district due the discrepancy between many industrial sectors and higher and technical education in the district. For example there are no universities in the district offering engineering disciplines such as Automobiles, Electronics, Metal formation all of which have been identified as high potential sectors in the district. Additionally, there is an inadequate number of universities and technical institutes in the district. With only 16 TEVTA institutes in Gujranwala and only 3.3% of the population attaining tertiary education, the education attainment in the district is unsatisfactory.

At the current rate of educational growth in Punjab, Figure 2.14 below depicts a snapshot of the current and 2047 education scenario without any reform or intervention. Most advanced countries have a tertiary education ratio of over 40%. By 2047, Punjab should at least aim to achieve 30% tertiary education ratio.

Punjab is currently experiencing the phenomenon of Youth bulge. The existing working age population of

Punjab and the growing youth population presents itself as another opportunity for the province to enhance its industrial potential and competitiveness provided that the human capital is logically developed to cater to specific demands of the potential industrial sectors.

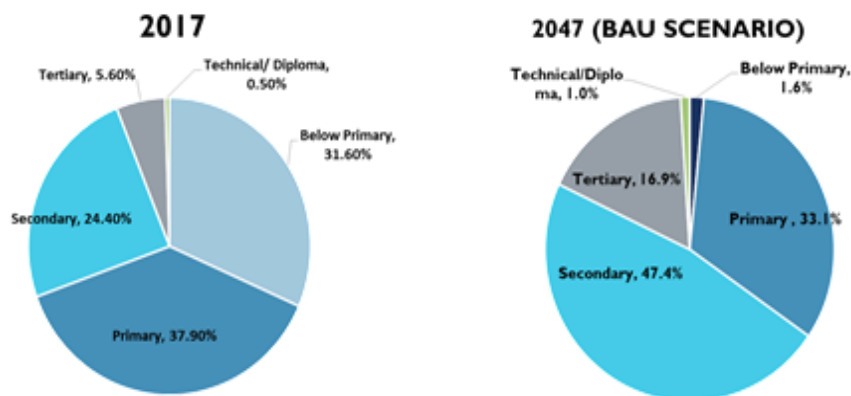
Currently, the available human capital in the province is only adequate to support low technology manufacturing sectors. If Punjab is able to produce a workforce with a higher productivity and a varied skillset for specific sectors, the low cost of labour can be leveraged to attract relocation of not only Chinese industries but global investment into the industrial sector. Additionally to thrust the industrial sector of Punjab into high technology sectors including IT, a technical and highly-skilled human capital needs to be developed which is virtually non-existent in the province currently. The issue of labour participation rate also needs to be addressed by bridging the skill gap through demand driven skill trainings. The low female participation in the labor force can also to be radically improved by encouraging their employment in labour intensive sectors.

Table 2.7 current and predicted demographics for Punjab

Demographics	2017	2047
Punjab Population (million)	110	180
Working Age Population (million)	69	125
Labour Force Participation Rate %	61	80
Active Labour Force* (million)	39	96
New Jobs needed by 2047 (million)	60	

Source: Urban Unit Projections based on Punjab Population Policy, 2017 and UN Population Prospectus 2017

Figure 2.14 Education ratios in 2017 and 2047 (bau scenario)



Source: Urban Unit based inter-censal trends



2.2.3 Competitiveness and Cost of Doing Business

The industrial sector of Punjab is marred with low productivity and hence competitiveness in the international market. With regional competition like India and Bangladesh taking effective measures to improve international competitiveness it has become imperative for Punjab to partake in productivity enhancing measures to stay relevant in global markets and value chains.

The industrial sector is currently facing several bottlenecks, which diminish the productivity of the firms in all industrial sectors of Punjab. Pakistan is currently ranked a lowly 115 in the Global Competitiveness Index. In comparison, India and Bangladesh are ranked at 40 and 99 respectively (World Bank, 2017). Similarly, Pakistan has received a low rank of 147 in the Doing Business Index. In comparison, China ranks 78 and India has a rank of 100 (World Bank, 2018). Table 2.8 below sheds light on the contributory factors for the low productivity by comparing key input prices for and

availability to the industrial sector in Punjab with other regional economies.

Limited local market

Despite having a large population, Pakistan has received a low rank in the domestic market size index (World Bank, 2017) primarily due to the low purchasing power of its populace, which restricts the profitability of the firms.

High cost of Energy and Utilities

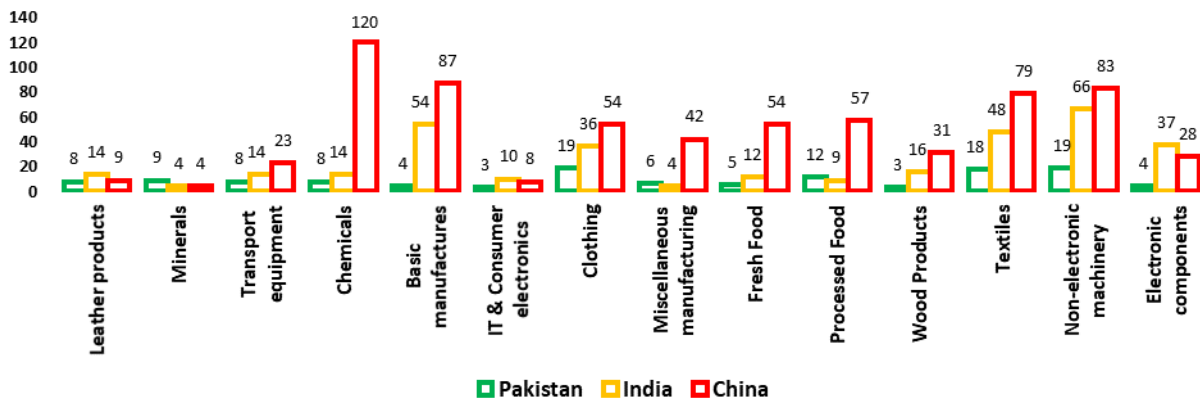
Among several other factors, the high cost and shortage of electricity is detrimental for the productivity of the industrial sector. Punjab is currently facing a deficit of electricity, which mainly affects the industrial sector. Additionally, the main reason for the high cost of electricity is due to the inefficient electricity mix of electricity production. 70% of the electricity is produced using expensive thermal fuels, which significantly drive up electricity cost. Similarly, high rates of fuels diminish the competitiveness of the industry.

Table 2.8 Regional competitiveness matrix on several input variables (darker color shows lower competitiveness)

Exports Competitiveness Parameters	INDIA	VIETNAM	BANGLADESH	CHINA	PAKISTAN
Labour Cost	Light Yellow	Light Yellow	Light Yellow	Red	Light Yellow
Pay and productivity (GCI 2017)	Light Yellow	Light Yellow	Light Yellow	Red	Light Yellow
Electricity Tariff	Light Yellow	Light Yellow	Light Yellow	Red	Light Yellow
Natural Gas Tariff	Light Yellow	Light Yellow	Light Yellow	Red	Light Yellow
Electricity Supply quality (GCI 2017)	Light Yellow	Light Yellow	Light Yellow	Red	Light Yellow
Transportation Cost (Diesel Rate)	Red	Light Yellow	Light Yellow	Red	Light Yellow
Land cost, Leasing Price	Light Yellow	Light Yellow	Light Yellow	Red	Light Yellow
Policy Rate	Red	Light Yellow	Light Yellow	Red	Light Yellow
Currency Change % per USD	Red	Light Yellow	Light Yellow	Red	Light Yellow
Raw Water Cost	Red	Light Yellow	Light Yellow	Red	Light Yellow
Free Market Access-EU/US	Red	Light Yellow	Light Yellow	Red	Light Yellow
Domestic market size (GCI 2017)	Light Yellow	Light Yellow	Light Yellow	Red	Light Yellow
Foreign market size (GCI 2017)	Light Yellow	Light Yellow	Light Yellow	Red	Light Yellow

Source: Data for variables has been collected from various sources

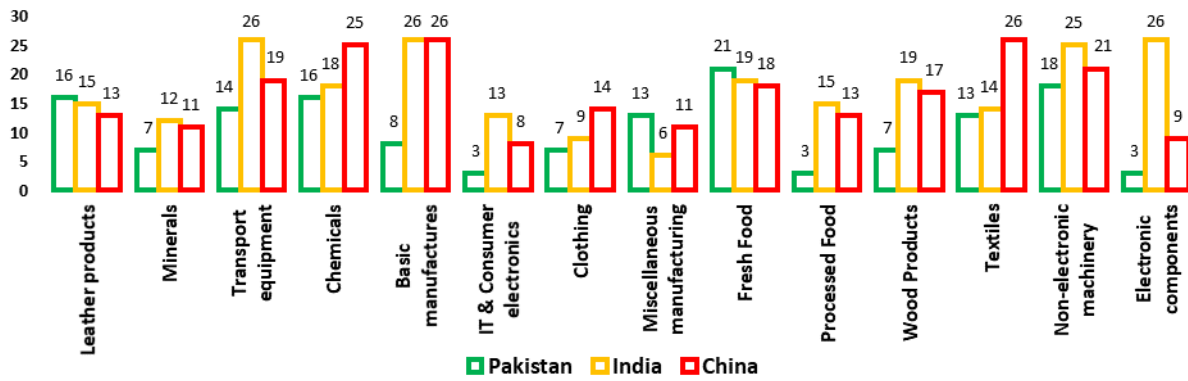
Figure 2.15 Number of products in sectors of Pakistan, India and China



Source: International Trade Centre, 2016



Figure 2.16 Number of global markets for sectors of Pakistan, India and China



Source: International Trade Centre, 2016

Low diversification of Exports

Most of Pakistan's export sectors have a low product diversification. Figure 2.15 compares the product diversification of the export sectors of Pakistan with India and China. Leather Products and Minerals are the only two sectors in which Pakistan's industry can be said to have diversified their products. In other sectors like basic manufacturing, Pakistan significantly lags behind other regional economies. A sector with highly diversified products means that the industry is catering to several, if not all, stages of the value chain in that sector which allows for the export of higher value added products. In Pakistan however, such complete product value chains exist only in a few sectors and in most cases lower value intermediary products are exported. Further value addition to our products is important to make our exports more competitive in the global market.

Similarly, an analysis of the diversification of the market for Pakistan's exports in Figure 2.16 shows that for three of the sectors, 1) leather products, 2) miscellaneous manufacturing and 3) fresh food, Pakistan has a well-diversified market which means that Pakistan is not dependent on a few countries for the export of products from that sector. However, for the other sectors, Pakistan has a considerably lower market diversification than other regional economies. The issue with having low market diversification for a sector is that Pakistan has a very low buffer for that sector and if imports from any particular market declines, the whole sector will take a hit as Pakistan will not have an immediate alternate market to turn to.

Lack of finance available to SMEs

Private Banks in the province are generally reluctant to finance the SMEs due to the involvement of high risk. Lengthy procedures, high cost of loan application and high collateral requirements are other reasons for the lack of finance to SMEs. This limits the entry of new entrepreneurs into the industrial sector and the up scaling of the existing smaller industries. Lack of finance also restricts the ability of the firm owners to upgrade their technology and train their employees.

Obsolete technology and production methods

Most of the industrial sectors of Punjab are operating on obsolete technology which is highly inefficient. This hampers the global competitiveness of Punjab's industry in comparison to countries like Bangladesh which is continuously building trade competence through introduction of modern, more efficient equipment. Lack of finance and awareness regarding more efficient technologies are the main hindrances in their incorporation in the industrial sector of Pakistan.

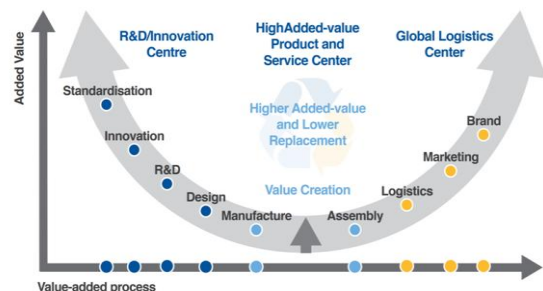
Lack of enabling infrastructure for industrialization

Most of the districts of Punjab lack the essential infrastructure such as connectivity, logistics and utilities which hampers the competitiveness of the manufacturing industries in Punjab and limits future industrialization prospects of the province.

Prevalence of undiversified and low technology agro-based sectors

The industrial sector of Punjab has an undiversified existence. Most of the prominent industrial sectors such as textiles, wearing apparel and food products are agro-based hence, although the contribution of agriculture to GDP had reduced over time but, there is still a strong dependence on agriculture and its products. The core industrial base of Punjab exists in the lowest technology strata as there is a distinct dearth of high-technology industries in the province.

Figure 2.17 Smiley curve of value addition



Source: World Economic Forum (2012)



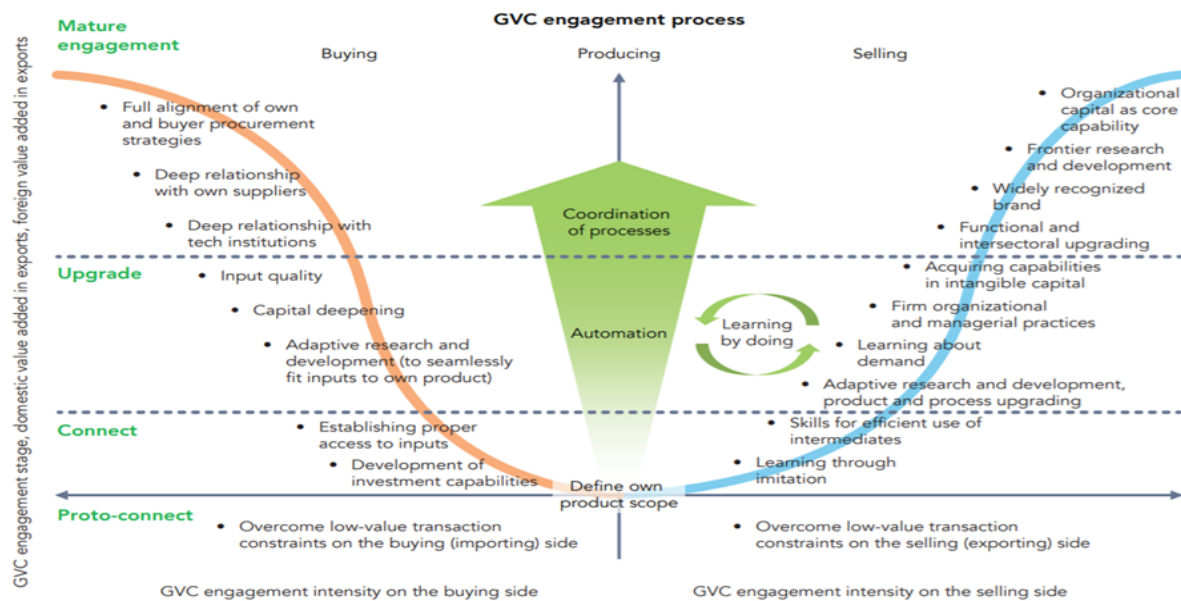
Cumbersome regulatory procedures and inconsistent tax regime

Investors have to go through multi-layered regulatory framework for firm registration and obtaining other NOCs and permits for establishment of new business. Many of the regulatory institutions in Punjab have an overlapping mandate giving rise to inefficient service delivery and regulation, which leads to a waste of government resources. In addition to this, the taxation regime in Punjab is very inconsistent which adds to the costs of compliance.

2.2.4 Punjab and Global Value Chains

Currently Punjab's manufacturing sector is producing and exporting low value added products, which brings in little export revenue to the province. The focus of industrialization efforts in the past has been on quantity

Figure 2.18 Evolving global value chain and its determinants



Source: Global Value Chain Development Report, 2017

2.2.5 ECONOMIC COOPERATION WITH CHINA (CPEC)

China in its bid to dominate global trade has set focus to increase connectivity in trade. The country has initiated a multibillion dollar project called OBOR to enhance trading linkages and cooperation between Eurasian countries and the China. CPEC is a massive bilateral project under OBOR that will help modernize and transform the road, rail, air and energy infrastructure. Similarly, the Central Asia Regional Economic Cooperation (CAREC) Program is a partnership of 11 countries (Afghanistan, Azerbaijan, China, Georgia, Kazakhstan, Kyrgyz Republic, Mongolia, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan). CAREC is a platform for these countries to emerge as a center of trade and commerce, achieve higher levels of economic growth, and reduce poverty. The aim is to achieve these goals by focusing on four pivotal areas of Transport; Trade Facilitation; Energy, and Trade Policy. Punjab based industries can leverage from CPEC and CAREC and

expansion rather than the improvement of quality and value addition to existing product lines. This has not allowed Punjab to capture a more lucrative share of global value chains.

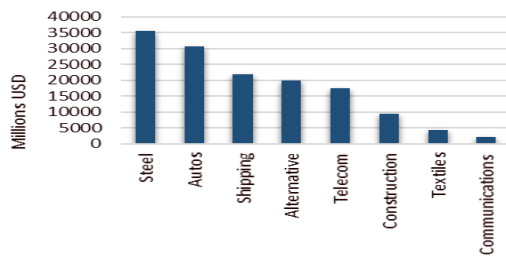
By aiming for relocation of Chinese industrial sectors with existing global markets to Punjab, the province has an opportunity to capture a significant share of the GVCs, at least at the manufacturing and assembly level.

Once Punjab enters the GVCs for various products, they can be further developed to increase the value of exported products, by employing the GVC engagement process depicted in Figure 2.18 below.

stabilize on its international trade and economy. China in its efforts to transform and move higher up on the value Chain has been looking to relocate its basic manufacturing sectors. Figure 2.19 depicts China's Global investments in manufacturing sectors over the past ten years. Similarly, Figure 2.20 shows the pattern of China's country-wise outward investments over the past 10 years.

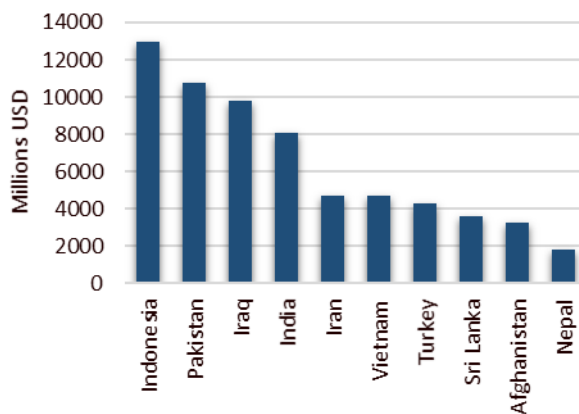


Figure 2.19 China's sector-wise global outward investments



Source: The American Enterprise Institute and the Heritage Foundation, 2017

Figure 2.20 China's country-wise global outward investments



Source: The American Enterprise Institute and the Heritage Foundation, 2017

Windows of opportunities for Punjab, Pakistan

Pakistan can attract these relocating sectors based on its advantage of youth bulge and lower labour cost. There is room for cooperation in Non-Electric Machinery, Transport, Clothing, Leather and Leather Products, Electronic Components, Minerals, Chemicals, Wood & Wood Products, Misc. Manufacturing and Computers, telecomm; cons. Electronics. Most of these sectors require low cost labour and basic technology.

Case for Misc. Manufacturing: LCD Panels: Analysing the LCD display panel (LCD) market, overall China has experienced a fall in its exports, however its imports have remained stable over the period from 2012 to 2016. Export data indicates increase from USA, Vietnam and France. In fact, Vietnam witnessed the maximum increase in its exports for LCD panels. This observed increase can also be emulated by Punjab.

Case for Articles of apparel and clothing accessories, knitted or crocheted: Major global exporters of apparel and clothing such as Hong Kong have experienced a drastic fall in exports however, China's imports have remained relatively stable from 2012-16. Countries such as Bangladesh, South Korea and Turkey have increased their exports into China.

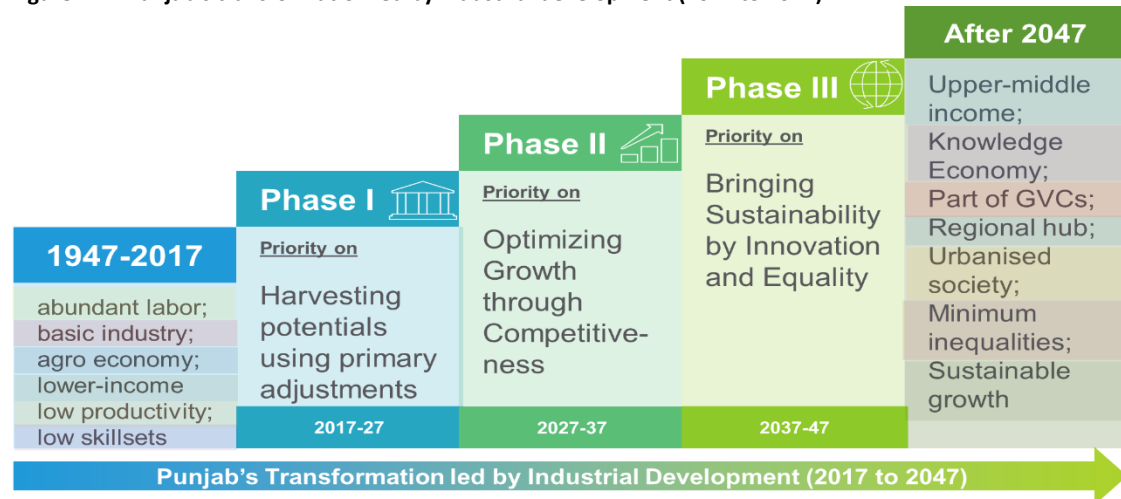
2.3 INDUSTRIAL DEVELOPMENT THROUGH TRANSFORMATIONS USING SPATIAL LENS

Prime objective for every long-term strategy of the country and Punjab, in particular, should be economic growth with job creation; driven by comparative advantages and transformations. Industrial sector may become a panacea for economic upheavals as the sector's multiplier effect in job creation is the largest covering both downstream and upstream sectors. Punjab, therefore, is also to promote the manufacturing sector for a sustainable and inclusive growth with focus on job creation and export earnings.

After stabilizing from a period of relatively lower growth, Punjab is set to unfold a transformation journey with a strategy for socio-economic growth across the province to enable Pakistan for catching-up the industrialization. The strategy, firstly, to align opportunities for investment in areas where it has genuine competitive advantages and gradually acceleration of growth in those areas where economic activity is the weakest in prevailing dynamics. In order to strengthen the Industrial sector and make it more competitive; there is a need to bridge the gaps, hindering industrial development; aided through a long-term framework, whereby all the key initiatives, investments, and institutions must be integrated for a coherent and evidence-based execution for a growth path. Following is the illustration of roadmap the PSS will espouse:



Figure 2.21 Punjab's transformation led by industrial development (2017 to 2047)



Source: Urban Unit

Phase I (2017-2027): Harvesting potentials using primary adjustments

The first phase will primarily promote factor-driven industrial growth and to concentrate on the existing strengths of Punjab i.e. untapped reservoir of cheap labour force, basic-level industry and strong agriculture base. The strategy will focus on the available resources and province's comparative advantages to exploit maximum opportunities with limited financial implications, trade-offs and complexities. In addition to labour, Punjab has a very strong agriculture base and mineral endowments which would play an anchoring role for attracting foreign investments in low-tech industries. Nevertheless, there are few industrial and economic hubs already available in the province that are advancing and thus shall be further supported in shifting them towards more complex value chains that will capture high economic yields and wider technology spill overs.

During the first phase, Punjab shall largely attract low technology and labour intensive sectors with export orientation to maximize static gains. Punjab would also attract global value chains in the new sectors from very bottom of the GVCs with minimalistic value addition initially but gradual expansions espousing snow-ball effects of FDIs. Present composition of the Human Capital is mostly low-skilled; skill supporting trainings through universities and knowledge centres would be developed by the government with public private partnership and joint ventures with the Chinese institutions leveraging CPEC opportunities. More importantly, the first phase will play a foundation role for the following phases which will target more complex and relatively high-end industrial value chains. Following are the key strategic targets for the first phase:

Table 2.9 Key strategic targets for phase 1

Parameters	2027 Targets
Economic contributions	Enhance Industrial sector share in the Provincial GDP contribution from 22% to 26% and Share of manufacturing employment other than present top-five sectors from 32% to 45%.
New Jobs creation	Create 7 million new jobs (direct & indirect) averaging above 700,000 jobs per year within the industrial value chains
Productivity and value additions	Enhance workers' productivity from \$ 4,350/worker to \$ 8,700/ worker and double the share of hi-tech firms from 1% to 2%
Scaling-up the Industry	The share of Large and Medium enterprises shall be enhanced from present 55% to 60% with focus on FDI in leading firms interacting with GVCs
Exports orientation	Exports ratio shall be enhanced from present 6% to 15% of the total firms for underpinning an outward-looking economy
Agglomeration and development of designated areas	Share of industries located in demarcated areas shall be enlarged from merely 3.5% to 10% by transforming Corridors, developing Clusters and SEZs in the priority areas. For this expansion, above 300 million SQM new area shall be demarcated and developed for investments.
Human Capital development	Transform the human resource to attain the demand-driven education with share of 30% secondary, 10% tertiary and 5% technical education from the present levels of 24%, 5.6% and 0.5% respectively.

Source: Urban Unit



Phase II (2027-37): Optimizing Growth through Competitiveness

The second phase shall capitalize on the improved production systems and relatively more productive and skilled labour. The structural foundation of labour training, technology and skills that will be stemmed in the first phase, will improve the overall technical capability of the industry in the second phase would be more visible. The second phase would focus on the development of a more sophisticated product portfolio largely with products that are of medium to high technology.

Focus should be on enhanced mechanization that is supported by higher absorption of technical labour to increase the diversification of Punjab's exports. Electronic, mechanical, automotive and high-tech products and parts should be the cornerstone of development in this phase. This stage would also require further investment in skill development for consumer services, development of efficient logistics and forward linkages. This investment would be necessary for sustainable development which marks the third stage of development.

If the first phase executes successfully, following are the key strategic targets for the second phase will follow

Table 2.10 Key strategic targets for phase 2

Parameters	2037 Targets
Economic contributions	Industrial share in provincial GDP shall further be targeted towards 35% mark and 50% share in overall jobs other than top five sectors
New Jobs creation	Above 1 million jobs/year i.e. 12.5 million new quality jobs (direct & indirect) would be required, within relatively more complex industrial chains, to support Punjab's transformation
Productivity and value additions	Industrial workers' average productivity shall further be increased to above \$ 17,400 level by optimizing production systems and supporting hi-tech firms to double their share i.e. 5%
Scaling-up the Industry	Large and Medium enterprises shall further be supported to reach 65% representation overall with more and extended representation of GVCs
Exports orientation	Exports shall be the main driver during this phase and exporting firms must surpass the 25% share in overall industry with highly competitive and diversified industrial value chains
Agglomeration and development of designated areas	30% level of planned industrial landscape shall be achieved by expanding Corridors, Clusters and SEZs and also by declaring most of the unplanned industries agglomerations shall as Industrial Zones/Areas or relocating them to the new Industrial Parks/SEZs. For this expansion, above 550 million SQM new area shall be demarcated and developed.
Human Capital development	Human Capital shall be further equipped with targeted and applied skills while reaching the attainment levels of 40% in Secondary education, 15% tertiary and 8% in technical education.

Source: Urban Unit

Stage III (2037-47): Bringing Sustainability through Innovation and equality

The strong deployment and investments in the first two phases will yield in the third phase to bring sustainability in province while fostering innovation and knowledge economy. After successful implementation in the first two decades, yielding in dynamic gains, certain sections of the economy would have more wealth prompting consumption and investments. Moreover, it will yield the province to overcome the inequalities across Punjab gradually.

Overall the culture for innovation would be incorporated to bring about sustainable and high value-added production mechanisms. To effectively

incorporate that, increased concentration in research and development to develop policies for knowledge economy would be deployed from the beginning of first phase. If followed, this would propel Pakistan to enter the status of upper-middle-income country with complex and high value addition in global value chains and sustainable development.

Following would be the key strategic targets for the second phase if the first two decades provided foundation as envisage:



Table 2.11 Key strategic targets for phase 3

Parameters	2047 Targets
Economic contributions	After successful transition towards knowledge economy, the Industry sector share in the provincial GDP would start declining targeting 25% but Jobs ratio to be improved to 60% by 2047.
New Jobs creation	Creation of 8 million (direct & indirect) new quality and high-tech jobs shall be targeted, within highly complex and industrial chains
Productivity and value additions	Augmentation of productivity levels would be needed to cross \$ 34,800/per worker by innovative systems and entering in the row Industry 4.0; supporting hi-tech firms to multiply their share to reach at 15%.
Scaling-up the Industry	Large & Medium scale sectors would be targeted at 70% – saturated with GVCs and foreign investments
Exports orientation	Exports shall remain the key instrument allowing exporting firms to represent above 40% share in overall industry composition with highly competitive and diversified industrial value chains and export markets
Agglomeration and development of designated areas	Industrial location within the designated, regulated, and aligned Corridors, Clusters and SEZs shall reach 50% level by attracting further relocations and greenfield investments. For this expansion, above 350 million SQM new area shall further be developed.
Human Capital development	Human resource will continuously be polished and trained with to support the innovation and knowledge economy. Targets shall be to enhance the pool of tertiary and technical labour force with attainment targets of reaching 45% in Secondary education, 30% tertiary and 10% in technical education.

Source: Urban Unit

2.3.1 Integrated Spatial Development

Industrial agglomeration, commonly phrased as Industrial Clusters, Special Economic Zones (SEZs), Estates, and Industrial Parks, has played a catalyst role in making the industrial sectors and their value chains more competitive. Integrated spatial planning is, therefore, very important and provides a conducive environment and integrated support towards achieving industrial agglomeration which leads to enhanced competitiveness ultimately. As illustrated, the Strategy is designed to offer an integrated development approach and to equip Punjab with several tool-kits for evidence-based industrial planning in realizing the framed targets. By adopting PSS framework, Punjab's capacity shall be enhanced to capture its full economic potential with competitive industry, and will also ensure that all parts of the province and its inhabitants fully participate in the envisaged economic success.

2.4 IDENTIFICATION AND DEVELOPMENT OF GROWTH NODES

Punjab has high potential to grow multifariously by leveraging on its natural endowments, abundant human resources and the game-changer, CPEC. Punjab, by aligning its resources, under spatial planning framework is set to yield real and inclusive growth while fostering competitiveness at the same time. For this endeavour, however, there is a need to activate its latent resources, optimize allocations, and realign structures under a premeditated and sustainable roadmap for expanding Punjab's economic shape.

In present Punjab, there are still too many places which have fragile economic contributions and limited opportunities for industrialization. On the other hand, there are numerous hubs of economic activities which are expanding and contributing to the provincial and national accounts significantly. Punjab Spatial Strategy (PSS) to capitalize on the Punjab's existing economic centres to ignite the engine for an accelerated growth and for addressing the spatial imbalances – and Punjab as a leading Province – it is fundamental to its inclusive development agenda. Though, the success of this framework predominately relies on the institutional capacities and political ownership. Learning from the Chinese experiences on its SEZs and industrial clusters led growth, Punjab will also follow such preferential spatial policy treatments with broad institutional autonomy. In addition, however, a dedicated support of government, especially in the areas of public goods; public-private partnerships; FDI and investment from the Pakistani diaspora; competitive business environment; continuous technology learning and continuous upgrading is very important and shall play a catalyst role.

The success of SEZs and industrial clusters requires a very pragmatic framework and a well-functioning ecosystem. Globally, the proportion of SEZ failures are higher than successes mainly due to weak market signals and limited domestic comparative advantages which are often beyond the economic development framework and comes with minimum spatial integrations. In Punjab also, there are couple of case studies are available which are not attracting investments primarily due to poor site selections. The role and significance of the PSS is, therefore, very high

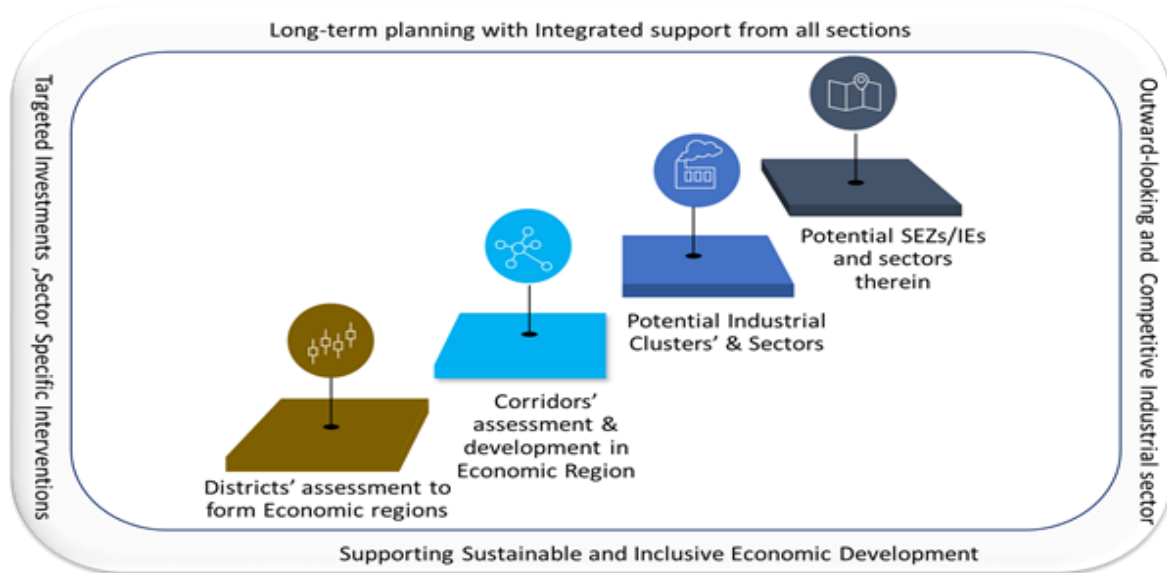


that identifies areas to establish growth poles in the province based on the strong spatial linkages and comparative advantages.

Due to its highly complex nature, the industrial spatial planning process is, therefore, divided into four different stages: identification of macro-locations (i.e., the districts) followed by the potential corridors within those, and industrial sectors (including existing clusters)

categorization and, the selection of proposed micro-locations based on the industry requirements (i.e., the specific locations). Zelenovic (2003) referred to a similar hierarchal approach which emphasizes on the phasing of (macro and micro) location process consisting of four phases. In this respect, following is the overall schematic approach the PSS followed:

Figure 2.22 Schematic approach for identification of growth nodes

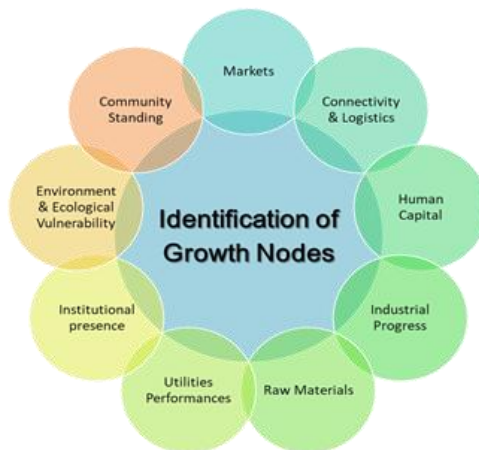


Source: Urban Unit

As mentioned the process starts from identification of growth nodes (high potential districts) in Punjab, and keeping in view the local dynamics and data availability, the PSS focuses on nine different dimensions and arraying above 141-factors for ranking the districts of Punjab in the first attempt. Following is the brief portray. The dimensions are computed using a series of sub-dimensions and factors based on the weights assigned using statistical modelling and tools to rank

districts of Punjab on different spheres. The framework is an overarching attempt that helps in archiving all the critical factors on the district levels in first phase. All factors which are considered important for the industrial development have been arrayed into nine different dimensions:

Figure 2.23 Dimensions for identification of growth nodes⁴



⁴ List of all variables for district ranking is provided in Annexure II



Source: Urban Unit

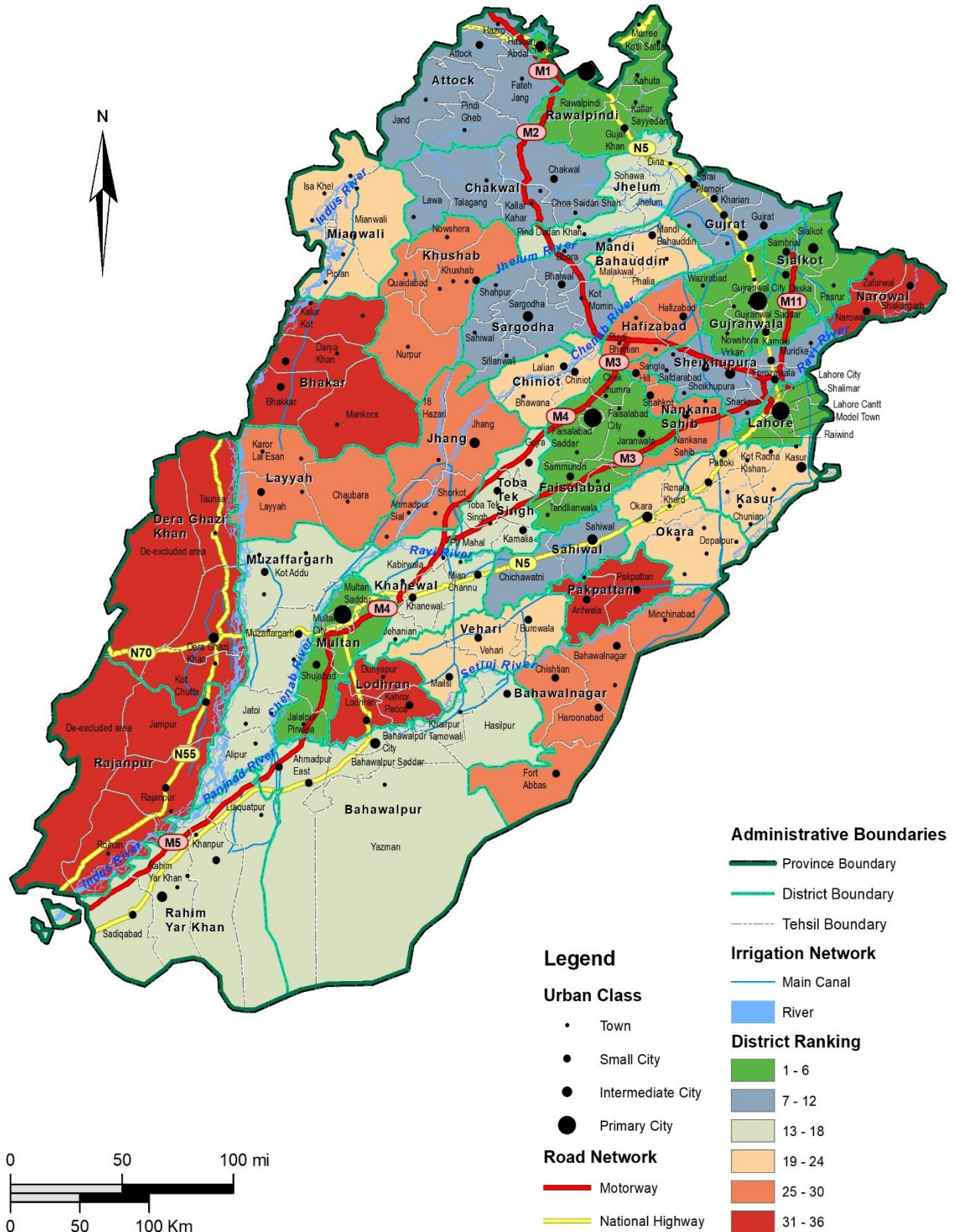
Table 2.12 Overall district ranking based in multi-dimensional analysis

Districts	Markets	Connectivity	Human Capital	Industrial Progress	Raw Materials	Utilities	Institutions	Enviro-Eco	Community	Overall Rank
Lahore	1	2	2	2	27	1	1	30	1	1
Faisalabad	2	3	3	1	8	12	2	21	6	2
Rawalpindi	3	1	1	11	25	7	4	36	4	3
Gujranwala	4	12	8	3	14	6	5	26	7	4
Multan	8	4	4	6	20	2	3	16	18	5
Sialkot	6	5	12	4	29	9	6	32	5	6
Chakwal	13	20	6	18	1	23	15	18	11	7
Attock	7	6	5	26	3	19	14	24	10	8
Sheikhupura	12	8	14	5	12	4	17	19	9	9
Sargodha	16	10	13	8	4	24	8	20	14	10
Gujrat	5	30	7	9	28	17	9	27	2	11
Sahiwal	9	23	11	20	21	3	11	13	16	12
Muzaffargarh	29	13	33	23	2	8	16	10	29	13
TT Singh	10	11	16	15	26	22	29	9	12	14
Jhelum	11	16	9	13	31	10	21	33	3	15
Bahawalpur	31	9	10	31	9	15	7	28	27	16
Khanewal	23	14	21	14	16	5	19	3	28	17
RYK	19	7	27	29	7	13	10	17	34	18
Okara	14	24	17	10	18	26	13	15	23	19
Kasur	15	31	23	7	23	16	20	6	20	20
Mianwali	24	21	15	32	11	20	22	8	21	21
Vehari	18	29	24	19	24	27	18	5	19	22
MB Din	22	18	29	12	30	18	25	22	17	23
Chiniot	34	27	18	16	13	25	36	7	25	24
Hafizabad	32	17	20	17	35	21	34	11	15	25
Jhang	25	15	22	30	15	34	23	2	31	26
Nankana Sahib	20	22	19	35	32	14	35	12	13	27
Bahawalnagar	28	28	30	28	22	28	24	1	33	28
Layyah	26	35	31	24	10	29	30	23	26	29
Khushab	27	19	26	22	19	33	26	29	22	30
Bhakkar	35	36	28	21	6	31	32	31	32	31
Lodhran	21	25	25	34	34	32	31	4	24	32
DG Khan	33	26	32	33	5	30	12	35	35	33
Narowal	30	33	35	27	36	36	27	25	8	34
Pakpattan	17	34	34	36	33	11	28	14	30	35
Rajapur	36	32	36	25	17	35	33	34	36	36

Source: Urban Unit



Figure 2.24 Overall district ranking



Source: Urban Unit



As presented in Table 2.12, all the districts of Punjab are ranked on multidimensional levels and each dimension is portraying a different set of factors for the suitability of industrial development across thirty six districts. Among others, one objective of this ranking was to identify the potential industries that can be optimally placed in the various districts of Punjab based on the particular needs of the industry and the potential of the top-ranked districts to meet those industries basic requirements. PSS has, therefore, used this approach to calibrate the most conducive districts based on their comparative advantages and to provide appropriate instruments for transmuting those to competitive advantages, instead.

Overall, top-ranked districts are considered as the most suitable destination for the future industrialization, particularly for early harvesting phase. The bottom-ranked districts, however, will play an important and supportive role in the successful transition of the highly potential districts to economic hubs. On priority, the PSS shall focus on the high potential districts and regions to optimize the provincial economic value and to distribute its impact on the weaker districts and regions for achieving sustainable and equitable growth. For instance, DG Khan is ranked good on the Raw Materials availability and is bordering with Muzaffargarh (one of the top district) will attract in housing the limited number weight-losing industries, in the first phase. Nevertheless, the district's strategic location and CPEC central alignment will play an important role in opening-up for the economic progress. Similarly, Rajanpur, Pakpatan, Narowal and other bottom-tier districts are portraying a position with limited attraction for private sector investments and development of industrial base at this stage, mainly due to their poor standing on different industrial feasibility related spheres. Nevertheless, these districts may emerge as conducive destination for businesses gradually but after leveraging on spill overs of the high-yielding and neighbouring districts eventually.

2.4.1 Dimensions

Market Potential

Consideration and assessment of markets is the most important factor while considering the industrial site selection, especially when the proposed industry is either labour intensive and/or consumers' centric. For PSS, the Market Potential assessment was performed using nineteen different factors and various sub-dimensions on district level of Punjab.

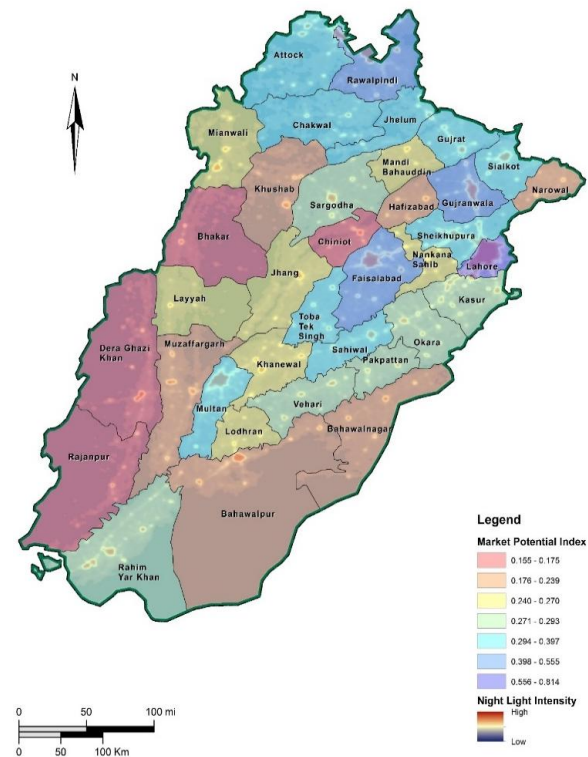
The composition of Market Potential are Market Size, Intensity, Growth, Consumption Capacity, Commercial Infrastructure and Risks. Among the assessment criteria, the major contributing factor in the assessment was the population size, urban centers and their growth. However, there are several other factors, including middleclass share, disposable income levels and spending levels, which have helped few districts to secure positions among top ten districts despite their comparatively lower share in overall population e.g. Attock and Gujrat.

Policy: The role of the Urban Centers, as the most significant driver in Market potential, will be further

strengthened across the province. All districts will primarily focus on the urbanization to support in industrial, business, and retail activity in Punjab. And top-ranked districts' headquarters will be given priority for investment in development and infrastructure improvements for their urban centers. Lahore and other divisional headquarters, however, will have an important role in attracting highly productive economic activities for Punjab. Such development lever will support a significant increase in jobs creation and market potential eventually. Moreover, a diverse range of commercial locations and spaces shall be demarcated to accommodate the diverse needs of the different growing market segments.

The increasingly important role of cities, particularly in high potential districts, will be enhanced sizably, whilst augmenting their economic base, with an enhanced mix and quality infrastructure to make markets more competitive and inclusive. This should be supported with both hard and soft infrastructure. The existing commercial assets within urban centers will be maintained, and the transformation of markets shall be carefully executed. Development and redevelopment will be supported on other sites where this will result in a more efficient use of the space.

Figure 2.25 Market potential



Source: Urban Unit



Connectivity & Logistics

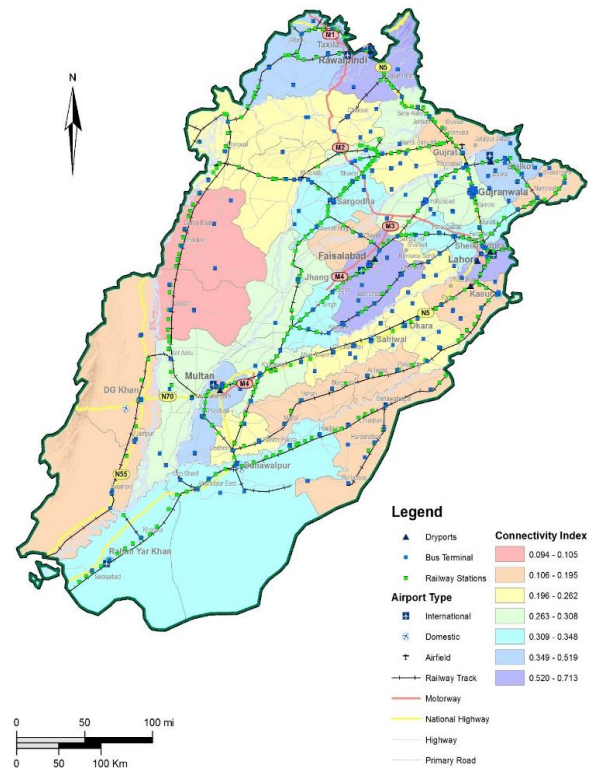
Connectivity is the most critical and important aspect for any segment of the economy. For Industrial sector, however, connectivity with logistics support is a requisite and therefore plays a central role in selection of industrial sites. In Punjab, most of the public sector development related expenditure is also consumed by connectivity related projects. PSS has, therefore, ranked all the districts of Punjab on various modes of connectivity and logistics to identify optimum connected and least connected districts of the province. Fifteen different factors were pooled to measure both connectivity and logistics infrastructure across districts in the province.

Variety of roads (covering Primary, Secondary and Tertiary as proportion to the districts' areas), Railways, Airports, Dry ports, Trucks, Terminals, CPEC, Storage houses, and digital connectivity are among the most important factors that are used for ranking districts under Connectivity and Logistics dimension. Overall, the inter-district disparity in connectivity infrastructure is much lower than the logistics support. Layyah, Bhakar, Pakpattan and Chiniot are the least connected districts whereas Rawalpindi, Lahore, Faisalabad, Attock, Multan and Rahim Yar Khan are highly connected. For logistics, only Rawalpindi, Lahore, Faisalabad and Sialkot are positioned with better scores and therefore the difference from the top-tier districts is relatively larger.

Policy: Developing fully integrated, high capacity, sustainable transport and logistics networks to facilitate economic growth is the key priority under PSS. Provision of new roads, railways, dry ports, and airports are among the focused areas of mega infrastructure related future investments. Most importantly, digital connectivity with high-speed access and logistics networks shall be provided in the first phase on priority for the top-ranked districts. Moreover, major improvements for accessibility to public transport, through high-speed inter-district and inter-city connections, as well as enhanced sustainable connectivity from across Pakistan and transnational networks, CPEC in particular, will further increase the attractiveness of the province as a competitive businesses location destination while increasing access to people for work, life and leisure.

Such expansion in transportation networks shall require a carbon mitigation strategy to minimize the footprints which will require further investment to attain a sustainable growth. Notwithstanding, the hard side of infrastructure in both connectivity and logistics needs to be complemented by a series of effective software i.e. Instruments and interventions with fully responsive institutions throughout the PSS implementation framework.

Figure 2.26 Connectivity & logistics



Source: Urban Unit

Human Capital

A robust economic growth is largely dependent on the pool of human resource and its skillsets and therefore Human Capital is proven as a leading contributing factor for the development of any society. PSS in its benchmarking attempt has developed a composite framework to ascertain the human capital at district level of Punjab. To measure the human capital, for industrialization purposes, eighteen indicators have been pooled into four different components. Each component measures a different degree of Human Capital which converges over the period and also inter-dependent in nature.

1) Basic Knowledge measures the districts' score with basic level of knowledge and skills only: 2) Skillset measures the technical capabilities and advance skill levels: 3) Innovation & Ingenuity measures the highly advance skills and capabilities: and 4) Economic participation measures the willingness and wellness of the available resource towards participation in respective district economy.

Industrialized cities of Punjab such as Lahore, Faisalabad, and Multan have the highest proportion of population with higher human capital scores. On the other hand, districts such as Layyah, Rajanpur, Pakpattan, Bahawalnagar and Narowal have witnessed a very low human capital score. This inequality has also



emerged into the least industrialization of the districts of Punjab indicating the importance of human capital in industrial and economic development of the regions.

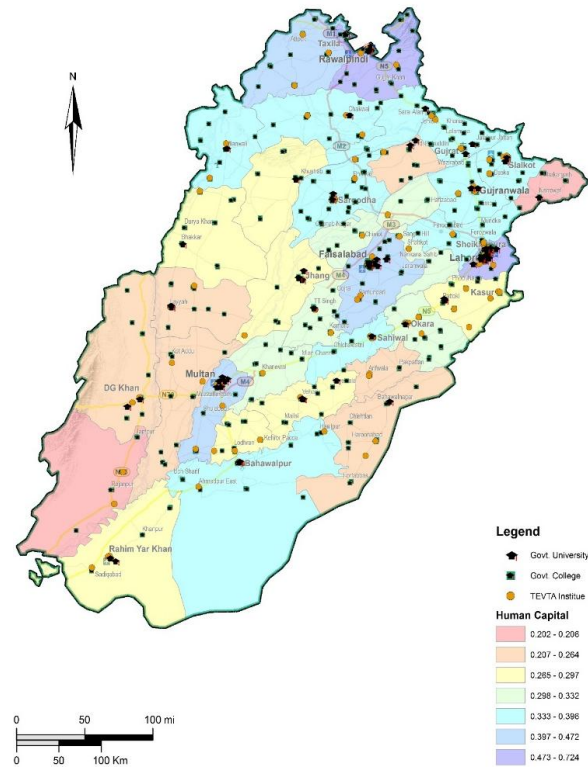
Policy: Punjab's well-educated and skilled inhabitants are able to attract large group of skill and labour intensive industrial establishments in future. To harbour full advantage of abundant human resource there is a need to transmute that into a high yielding human capital. In this regard, following priorities may be adopted under PSS:

- Alignment and enhancement of public-sector expenditure for the lagged behind districts and cities of Punjab to make them at par with developed districts for more equitable and sustained capital formation
- Localized reforms in education and health sectors with enabling environment and support of local institutions with special focus on active women participation
- Offer new schemes for the up gradation of existing Technical and/or Vocational Training Centres, Research Centres and also for development of news institutions.
- Special allocations to integrate Punjab's youth with Global Talent Value Chain (GTV) and for harmonizing its high-skilled workers in the global market especially in IT and other High-tech fields.
- Establishment of Skill & Knowledge Incubation Centres for highly potential (innovative) districts to promote the innovation with enabling instruments and regulations i.e. patents, copyrights at local levels
- Skill matching and demand-driven Human Capital formation through better Industry-Academia Linkages
- Deployment of Monitoring and Evaluation tools to help Punjab in achieving speedy convergence and accumulation

Industrial Progress

Punjab has always been at the forefront of industrial and economic progress in the country, which has resulted in a diverse range of industrial base majorly represented by the SME sector. Presently, Punjab's industry is highly concentrated in various clusters of textiles, surgical items, sports goods, metal products and food industry. There are various sectors, however, which are not concentrated to form clusters and therefore scattered across the province. Due to various constraints including energy shortages, the industrial expansion has been contained and has delivered a lackluster performance in recent decades. Industrial progress of Punjab on district level and spatially is measured using a multi-facet ranking tool. Industrial intensity (representing employment and turnover), concentration (industrial units), diversification (number of sub-sectors) and operationalization (proportion of active/operational industry) factors are combined together to rank districts on industrial progress. Whilst the top-ranked districts are intuitively the industrial hub of Punjab but there are various districts which are positioned very well in almost all other dimensions but registered a very limited industrial progress e.g. Rawalpindi, Attock, Chakwal, Bahawalpur and Muzaffargarh. Bottom-tier of the industrial progress ranking is substantiating that those districts are not in

Figure 2.27 Human capital



Source: Urban Unit

position to attract industrial establishment as those have also ranked lowest in other dimensions.

Policy: While leveraging CPEC, with present industrial base, abundant labour, agriculture, natural endowments, Punjab can attract large pool of labour intensive and weight-losing industry relocations from the world, in particular from China. Punjab can be a miracle after thirty years in the world's economy provided that the focus shifts from inward-looking agrarian economy to an outward-looking manufacturing economy connected to the global markets.

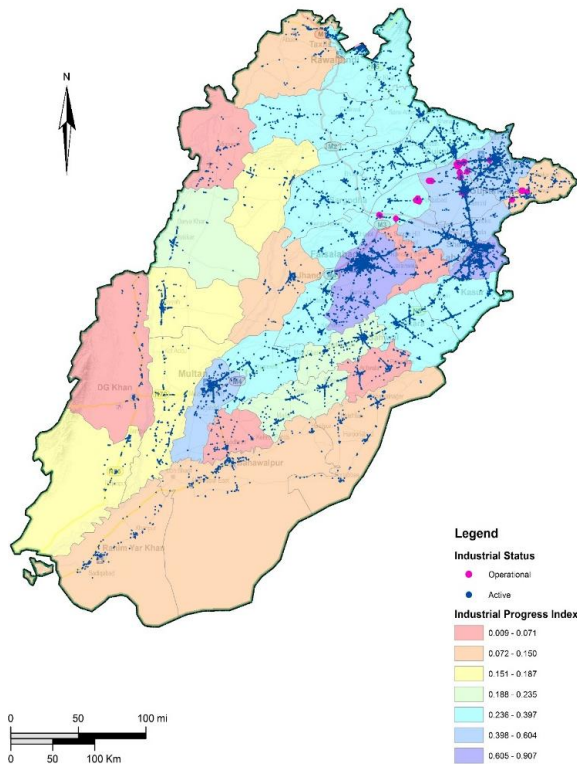
Espying improved and enhanced connectivity, Punjab will structurally transform its economy by housing Global Value Chains (GVC) to propel the province as a global hub for manufacturing and exports. In this endeavor, the PSS will play an anchor role. To transform the province economic base, following are the key strategic interventions laid to augment the industrial progress across the province;

- A one-stop facilitation network shall be deployed with integrated institutional framework guided by a DSS
- Priority investments, in both hardware and software elements, shall be made in the high-potential identified economic areas to improve their overall competitiveness
- Existing clusters and industrial estates shall be supported to expand and become more competitive and sustainable



- Deployment of industrial estate and SEZs locations selection system based on evidences and needs of the private sectors
- A varied range of high ranked sites will be made available across the Punjab, to support in creating new jobs and enabling the restructuring of industry while sponsoring the economic diversity.

Figure 2.28 Industrial progress



Source: Urban Unit

Raw Materials

Historically, Punjab has been labelled as a resource rich part of the region mainly because of strong agriculture linkages with highly fertile land, vast irrigation network and rich livestock. The present dynamics of Punjab based industry are also highly linked with the agricultural economy. In addition to Agriculture, natural resources of the province are also very important. The PSS has pooled all the crops, fruits, livestock, mines and minerals related production to rank districts of Punjab with their raw material availability values and diversity.

Pakistan's largest Industrial sector, textile industry, is heavily reliant on the domestic cotton production which is mainly produced in Punjab. Pakistan's highest agriculture's sector export item is rice which is also chiefly produced and processed in Punjab. Contribution of Punjab's natural resources to the national accounts is also very high but not as much the agriculture is. Most of the natural resource based industry of Punjab is the weight-losing industry and located in the proximity of

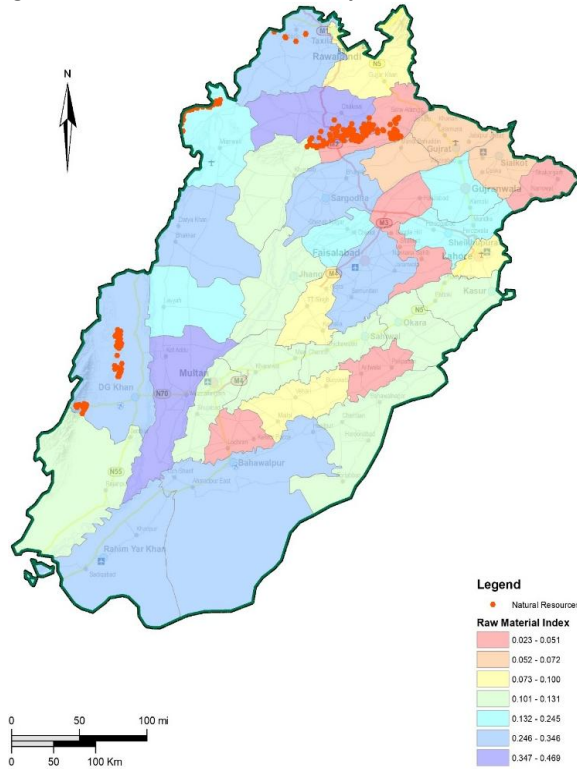
their required materials i.e. Cement plants. On the other hand, major industrial clusters of Punjab fall under weight-gaining industry as their focus is either domestic markets and/or labour availability. For example, Lahore, Gujrat, Sialkot and Multan are ranked very low in terms of raw materials availability, but are in advance positions on Industrial progress ranking. Faisalabad, Sargodha, Shiekhpura and Kasur are the districts which have both strong raw material bases and industrial progresses. There are also several districts which are in a very good position on raw materials availability, however, ranked poorly on industrial progress.

Policy: Undoubtedly, Punjab will be serving the country as a raw material base and to support industrialization. CPEC long-term plan is espousing Punjab agricultural base to fuel the economic transformation of the province. It is, therefore, imperative to optimise its raw material base in both vertical and horizontal manners. To fully exploit the province's agriculture and natural resources following priority actions may be implemented under PSS:

- Introduction of free market mechanism to improve the competitiveness of industrial sector and by removing price floor subsidies on the agro-based commodities.
- Promote and facilitate crop diversification (and substitutions) to optimise the value addition and processing while fostering environmental sustainability through minimizing consumption of water and chemicals i.e. fertilizers and pesticides
- Enhance the agriculture belts by adding new areas with better and improved infrastructure i.e. irrigation networks
- Free market mechanism shall be deployed to rationalize the commodities' prices (both agriculture and minerals) at import parity
- Support and facilitate in gardening new materials and industrial value chains out of traditional linkages.
- Encourage corporate farming and hybrid solutions using PPP streams and industry linkages
- Establish research centres and laboratories in collaboration with private sector at local
- Develop Special Processing Zones (for Agri and Minerals), loaded with integrated logistics network, in highly ranked regions to add values and export to world markets
- Promote weight-losing industry in the mineral-rich regions and weight-gaining industry in the agriculture zones to improve the overall competitiveness.



Figure 2.29 Raw material availability



Source: Urban Unit

Utilities Performance

Water and energization are identified as critical levers for the province’s economic and social development. In recent decade, Punjab based industry has faced acute energy shortages, in particular both electricity and natural gas. The energy deprivation has hampered the industrial sector competitiveness and resultantly exports has witnessed an unprecedented decline. While performance of other utilities including water and sewerages/drainages has, mostly, not been given much importance in the industrial corners of Punjab however, the imprudent exploitation of these utilities seek immediate attention.

PSS has mapped all the important utilities networks and their quality. For this purpose, both transmission and distribution network access of gas and electricity network is measured using various data sets. Water supply network, ground water table, and water quality is also pooled to rank the districts. Moreover, the quality of gas and electricity supply is also taken into consideration. Lahore, Shiekhupura, Sahiwal, Multan and Khanewal are top ranked districts with better scores in most of the utilities related parameters.

Policy: For sustainable economic development there are various aspects which require highest consideration while devising the utilities’ roadmap. To support Punjab with a robust and sustainable industrial development following are the key recommendations the PSS emphasises on;

Demand-side:

- Adoption (and promotion) of energy efficient industry technologies, appliances and products by using market-based instruments
- Maximize the share of renewable energy and promote off-grid solutions
- Development and deployment of a comprehensive water strategy for industrial sector to minimise its reliance on ground water and limit the improvident consumption of the depleting resource

Supply-side:

- Promote industrial locations and establishments in proximity to utilities networks
- Designate high potential clusters and economic development areas with priority utilities provision at internationally competitive rates to provide a level-playing field for the Punjab-based industry.
- Establish PPP based centralised integrated utilities solutions within industrial clusters, Industrial Estates, Zones and corridors to minimise losses and disruptions.
- Decentralised utilities networks and both strategic and cluster-led utilities schemes should be identified and enabled
- Facilitate and align investments for enhancing the indigenous and sustainable energy solutions instead of network-based energy supplies.

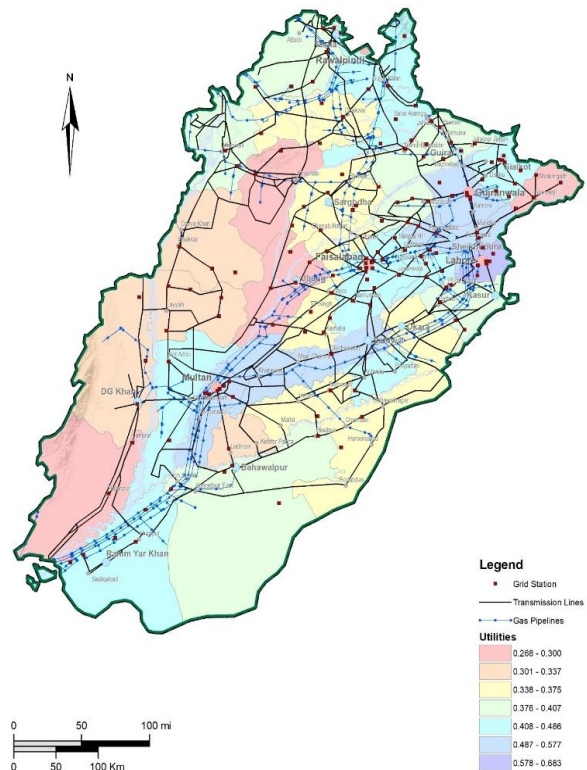


Figure 2.30 Utilities

Source: Urban Unit

Institutional Presence

The most serious impediments to industrial development are administrative (institutional), including



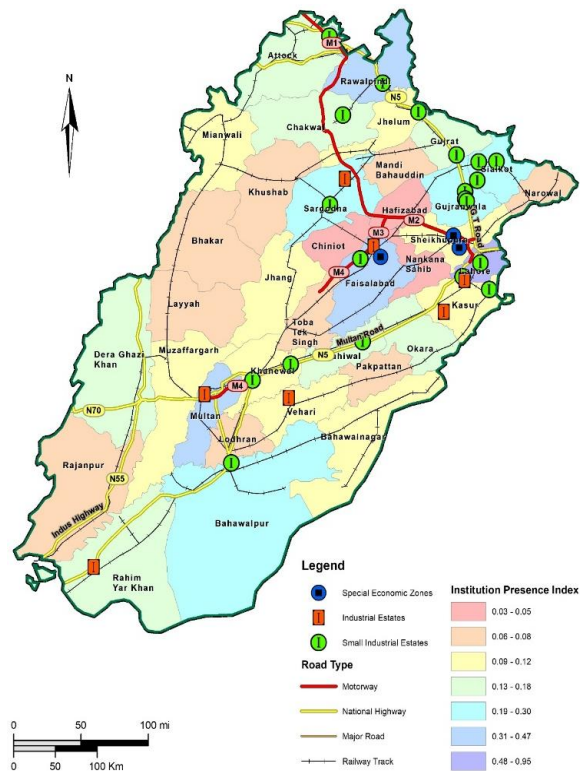
regulation, enforcements, facilitation and promotion of the industrial growth. Punjab, being the most industrialized province of the country, has not been able to expand its industrial base mainly because of the stringent doing business regime and weak institutional support. Country's ranking on global indicators is also pointing towards the severity of the situation in this respect. For example, Pakistan (Lahore) has been ranked at the 147th place in the Ease of Doing Business overall ranking and at 141st for building and construction permits, in particular. Most of the public-sector institutional arrangements are managed either at provincial level or federal level, as framed in the first chapter, therefore, the PSS has measured the presence of institutional support using district level positions instead.

To measure the Institutional presence on district level, the PSS has ranked the districts of Punjab by combining the presence of Public, Private, Political and autonomous (Judicial) institutions. Primarily, due to the nature of the purpose, most of the used factors and proxies are either directly or indirectly needed for industrial development. Most of the top-ranked districts are also seen as the leaders in other dimensional standings and overall. Districts which are divisional headquarters fare marginally better than the others. However, there are few districts which have secured among top positions without having status of divisional headquarters i.e. Sialkot, Gujrat, and Rahim Yar Khan. On the other hand, DG Khan and Sahiwal are the least scorer divisional headquarters. Most importantly, most of the outliers of the institutional presence ranking are also those districts which are not in good positions and thus reveal strong dependencies on inter-dimensions standings.

Policy: Presence of the institutions is important but the performance and support of the industry relevant institutions is relatively more important than their presence only. There are several weaknesses and issues which are needed to be addressed on priority to make Punjab the most conducive and priority destination for industrialization. The following proposals will be fundamental to improving intuitions presence, performances and inclusiveness:

- Establish development organizations in each highly potential economic area while considering responsiveness with representation of private sector and political leadership.
- Development of an autonomous industrial regulatory organization, with local offices.
- Private sector institutions shall be promoted by extending support in their capacity building and services
- Special offices and designated efforts shall be made to make business practices more conducive and supportive for industrial development.
- Financial access, and inclusiveness shall be improved by macro interventions and specialised credit and market based instruments.

Figure 2.31 Institutional presence



Source: Urban Unit

Enviro-Eco Vulnerability

Generally, Industrialization is considered as the engine of economic growth; however, at the same time, it is also labelled as detrimental for the environment mainly due to poor practices at the industrial levels and inappropriate planning at the government end.

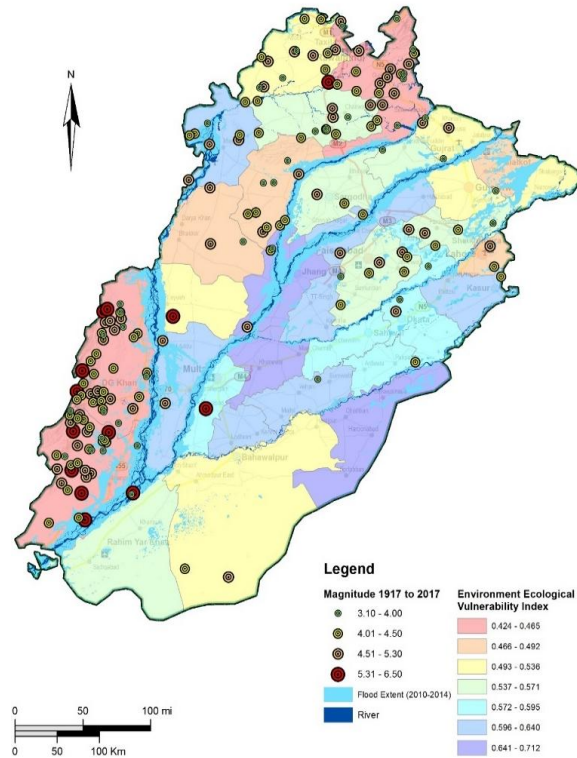
PSS is to offer a bridging tool and to enable the policymakers with an environmental-ecological barometer on a spatial level for informed decision making. PSS adopted a ranking approach carrying seventeen different factors and benchmarked districts of Punjab on the basis of environment and ecological vulnerability. Using this approach PSS has filtered most environmentally conducive districts and regions for the industrialization purposes. All the districts are indexed on four sub-dimensions, i.e. Climatic (conditions), Geospatial (elements), Risks and Quality (aspects).

Policy: Most of the environment and ecological risks have a geographic footprint, most notably: flooding, earthquake, metrological values, ground water quality, forests, environmental pollution and industrial hazards. With the help of assessment and PSS, Punjab chooses to devise a roadmap that will enable it to grow sustainably. For making Punjab's growth sustainable and resilient following key objectives will be realised to mitigate environment and ecological vulnerabilities:



- Demarcation of highly vulnerable locations shall be made as negative for industrial development and mitigation strategies only for those existing high-yielding economic regions, where if possible.
- Promote and facilitate the industrial sector to comply with environment friendly production and consumption best-practices
- Market-based instruments shall be made available to help the industrial sector in its adoption for cleaner production solutions using either green energy, energy efficient, water efficient and ZDHC production system
- Combined effluent treatment plants shall be established in all major industrial clusters with the collaboration of private sector; however, usage of water-less and ZDHC technology shall be given top priority.
- To limit the increasing pressure on water resource, water recycling and rain-water harvesting shall be also be promoted
- Provide high quality level of natural environment supported by high quality leisure and lifestyle amenities across Punjab attracting and retaining skilled workers
- Deliver higher standards of sustainable industrial design, incorporating green infrastructure to address environmental challenges and create move liveable places
- Fully integrated and spatial environment monitoring system, of international standard, shall be designed and installed across Punjab supported by high-tech and digital measuring devises (to transmit water quality, air pollution, noise levels and etc.).

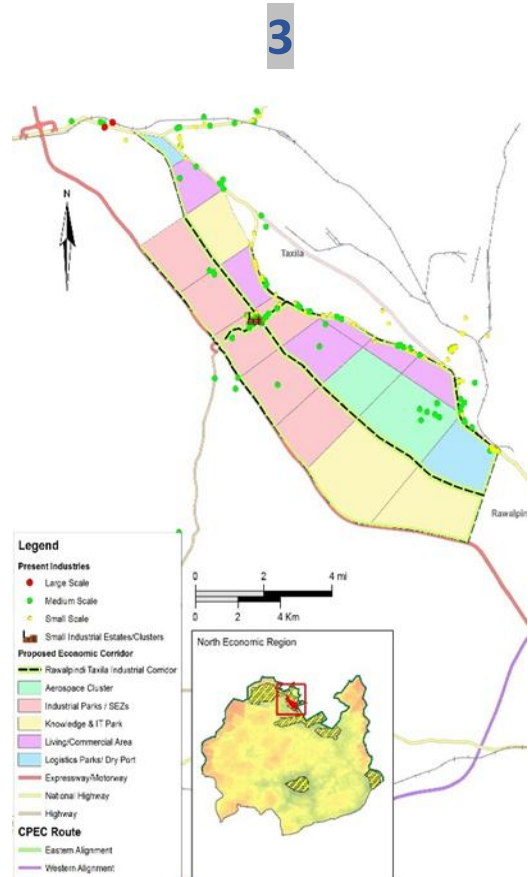
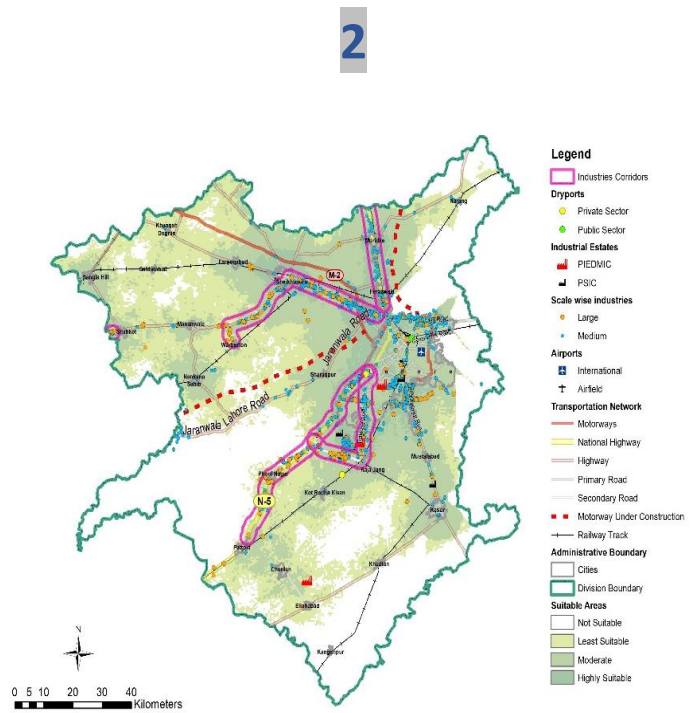
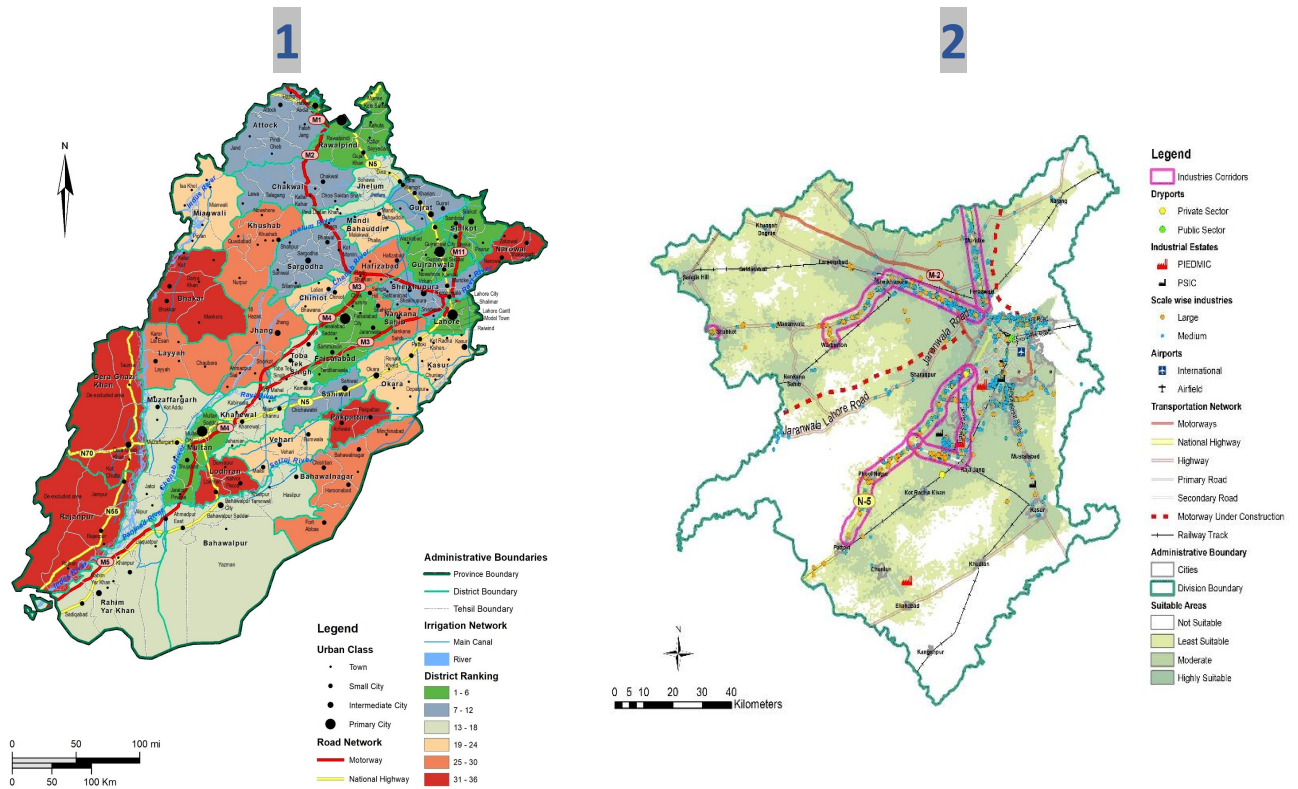
Figure 2.32 Enviro-eco vulnerability



Source: Urban Unit



Figure 2.33 Planning for competitive industrial development using spatial advantages – an illustration of the framework



- 4** Sectors' prioritization based on the spatial advantages and corridors' vision
- 5** Calibration of local plans
- 6** Alignment of Infrastructure & Investments support
- 7** Promotion, Development and Monitoring



Table 2.13 Development roadmap with supporting policies and instruments

Type	Main Features	Present Situation	Development Roadmap	Supporting Policies & Instruments
Key Economic Regions (KERs)	Composition of various districts to compose an identical area which has distinctive features and potentials	No Integrated Planning regime exists neither at divisional levels nor at district levels to fully optimise local level potentials	PSS has identified Punjab's KERs and to frame their long-term locale planning to achieve PSS vision while focusing transformations	Integrated planning and aligned public investments on infrastructure with business and regulatory policy reforms supported by dedicated institutions at local levels
Industrial & Economic Corridors (EICs)	Highly saturated and well-aligned major roads within KERs providing inter-cities and inter-regional economic development	Major connecting links/roads have not transformed yet into the economic corridors and are just transport corridors with very low density and isolated support services	PSS to transform Punjab's major corridors to economic corridors by leveraging on the existing infrastructures and businesses for their optimum utilization to maximize the economic benefits and returns in the KERs	Implementation of programs / projects based on the existing strengths and resources as well as economic growth potential along the high potential provincial corridors
Industrial Clusters (ICs)	Concentration of SMEs, businesses and institutions focusing on particular sectors	Punjab owns very few clusters which are not expanding and continuously losing their competitiveness due to lack of institutional and infrastructure support	PSS to revive Punjab's premature declining industrial clusters and after making them competitive and to create new clusters alongside based on province's competitive advantages.	Focused and specialized support to promote SMEs and sectoral development plans at cluster level.
Industrial Parks, Estates & SEZs	Demarcated, well-placed, and developed area to attract investments with swift processing	Punjab has developed dozens of Industrial Estates/SEZs out of which, however, number of projects are not successful yet mainly due to poor selection and inordinate support.	PSS to provide an evidence-based tool for selection of locations, sectors for development of future SEZs, Industrial Parks and Estates for achieving optimum economic yields	Incentivize, facilitate the private investments across the sectors (especially FDIs ranging from developers, enterprises, and in GVCs) to develop and create jobs within growth centres of Punjab

Source: Urban Unit

2.4.2 Economic Regions

The PSS has divided Punjab into six-economic regions based on various factors and linkages with particular focus on economic linkages and spatial advantages. For achieving structural transformation with balanced and equitable development, regional development shall play a pivotal role. In order to achieve the development targets and to make Punjab more conducive for driving economic growth, PSS offers a holistic eco-system by rolling-out detailed and integrated local development framework following the core strategy. The regional development framework will encompass the all respective regional share in the envisaged economic transformation covering their corridors development, clusters development and potential location of SEZs development. Detailed infrastructure development and required support shall also be featured in harmony with the proposed development roadmap. The regional plans in the detailed implementation framework of PSS will list respective corridors, Industrial estates/ SEZs and infrastructure to be developed in the regions with specific locations. The already industrialized regions will be developed and transformed into high-tech and advanced industrialized areas all the while playing an anchor role for other, currently under-developed regions.

BOX 2.2 ECONOMIC REGION DEVELOPMENT IN CHINA

China has successfully achieved its economic transition from an agrarian economy to an industrialized economy by focusing regional developments and integrated planning frameworks. Administrative areas of China have been clubbed into key economic regions which were identified and developed by sponsoring strategic infrastructural and economic reform. The major economic regions in China include: 1) The Pearl River Delta area; 2) Yangtze River Delta economic zone; 3) Bohai Economic Rim. This shift in economic management has yielded in multifarious economic returns. For instance, The pearl Delta River area accounts for less than 1% of the country's territory and 5% of its population, it generates more than a tenth of its GDP and a quarter of its exports.



Policy Recommendations

Keeping in view the competencies of the regions, integrated planning mechanisms will be developed at a regional and provincial level which will incorporate plans to upscale the competitive advantages by strategically locating and enabling growth corridors, clusters and industrial estates/ SEZs.

In order to successfully harness the potential and implement the development road map, every region should have their own designated economic and Industrial development authorities. The authorities should offer following functions:

- make policy and strategic decisions for the development and implementation of the master plan for the regions, their high potential corridors and clusters
- promote, stimulate, facilitate, coordinate, evaluate, and review the implementation of the development plan
- guide, consult and coordinate all the government entities regarding current and future investment potential within its corridors, clusters and SEZs
- identify the development proposals and the associated strategic investments within strategic areas
- monitor the status and progress on all approved developments and investments
- attract private sector under PPP to build infrastructure critical for economic growth.

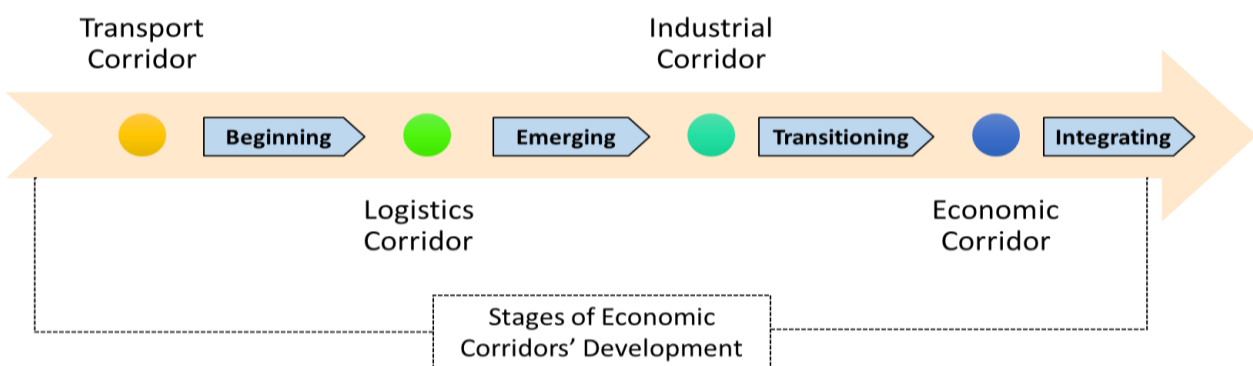
for developing economies. PSS shall capitalize on the corridor development approach. Corridor development framework will feature a comprehensive model supported by integrated development based on the existing advantages, and sector specific competencies as well as economic growth potential within the corridor region. The focus of the development is to optimize the existing infrastructures and utilities in order to reduce costs and maximize on the economic benefits and returns. The program shall be implemented with a model of development that meets the essential characteristics such as viability, sustainability and not rely solely on the provisions of the government. The development of corridors aims to encourage and ensure the involvement of local communities through creation of employment opportunities and involvement in the services industries, and community support.

Corridors are the main driving force for Punjab as most of the Industrial establishment is based along the major corridors. However, most of the industrialized corridors are not transitioning to become Economic corridors. Similarly, various corridors are still trapped either in beginning or emerging phases. Following development schema shall be followed by PSS in order to transform all potential transport corridors, logistics and Industrial corridors to Economic Corridors for an integrated development by 2047.

2.4.3 Corridors (Development framework)

Corridors development has long been the preferred mode of economic, social and industrial development

Figure 2.36 Stages of corridor development



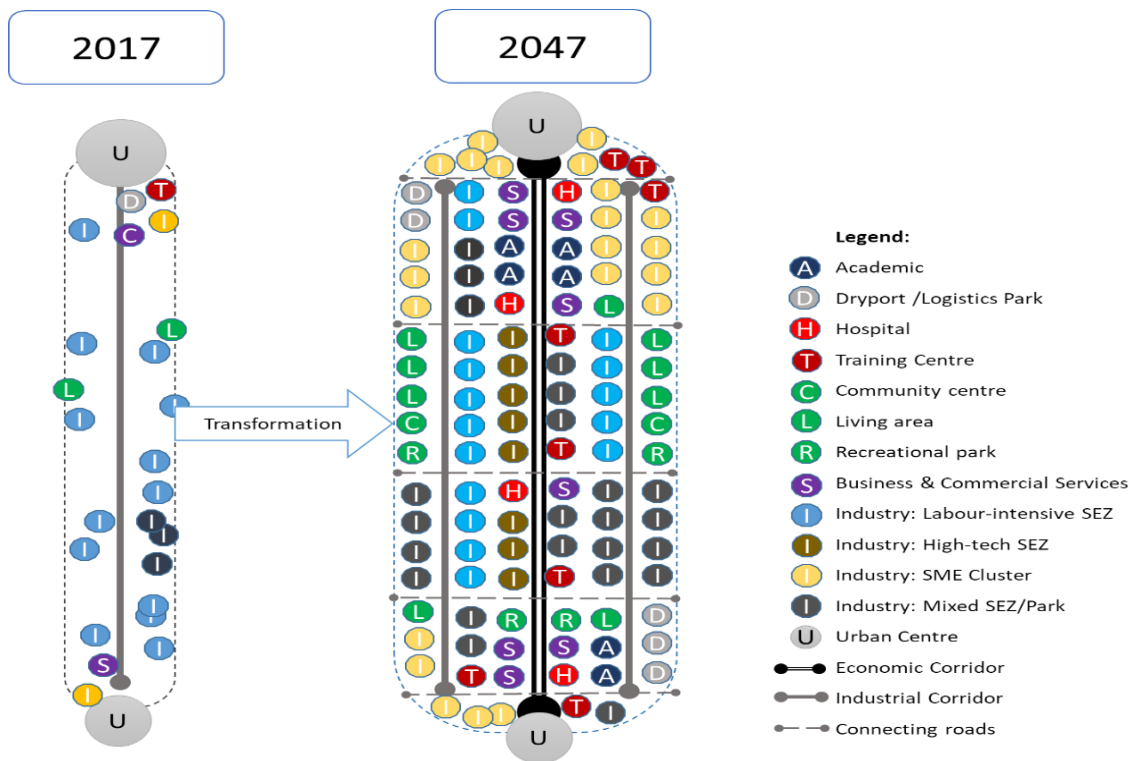
Source: ADB Guidelines

The PSS is designed to implement the above development roadmap featuring optimization of existing infrastructure and comparative advantages. As highlighted in earlier parts, the major highways and corridors are the most preferred locations for the industries which represents above 95% of the total

industry that is situated within two kilometers range of the primary roads. Keeping this preferential location as a rationale, the province shall be deploying following transformation illustration for converting Industrial Corridor to Economic Corridor:



Figure 2.37 Industrial corridor to economic corridor transformation



Source: Urban Unit

The regional plans of Punjab should identify and demarcate respective identified corridors with transformational roadmaps. To further expand the above-mentioned illustration, the PSS has chosen the Lahore-Shiekhupura road as an Industrial Corridor on priority within the Greater Lahore economic region. Although the corridor has a significant area which is not developed yet, the Lahore-Shiekhupura road is occupied and largely permeated with medium and large scale industrial establishments. If the Lahore-Shiekhupura road is declared an Industrial Corridor, this would have transformed into Economic Corridor in very short span of time. It is highly provident to develop this corridor with proper planning and support infrastructure. Both Lahore and Shiekhupura districts secure a very good standing in suitability in terms of industrial development as highlighted in earlier rankings.

The Lahore-Shiekhupura Corridor is an ideal case to test the corridor development strategy. Newly established Apparel Park (QAAP), having obtained the SEZ status, is also situated on the corridor. Moreover, the corridor is highly connected with primary road infrastructure and CPEC eastern alignment. The PSS purposes to develop two parallel dual-carriage roads both sides of the Corridor at a distance of 1-Kilometre. The parallel road network shall be connected with main corridor after every 4-kilometres with several cross-sections. The

Government shall announce the whole corridor (24-kilometers length) as an Industrial Corridor with land-use parameters for supporting its upgradation with

BOX 2.3 Regional Corridor Development in Malaysia

Through the development of corridors, the government of Malaysia aims to promote a more balanced development while achieving accelerated movement towards high-value, knowledge-driven activities and high income economy. One of the objectives behind this development is to engage the private sector and increase their role as a driving force for regional growth. The establishment of corridors will also help the government in identifying key economic sectors for promotion to entice anchor and supporting investors in each region.

Malaysia's Corridors:

- 1) Iskandar Malaysia in South Johor (IM)
- 2) Northern Corridor Economic Region (NCER)
- 3) East Coast Economic Region (ECER)
- 4) Sabah Development Corridor (SDC)
- 5) Sarawak Corridor of Renewable Energy (SCORE)

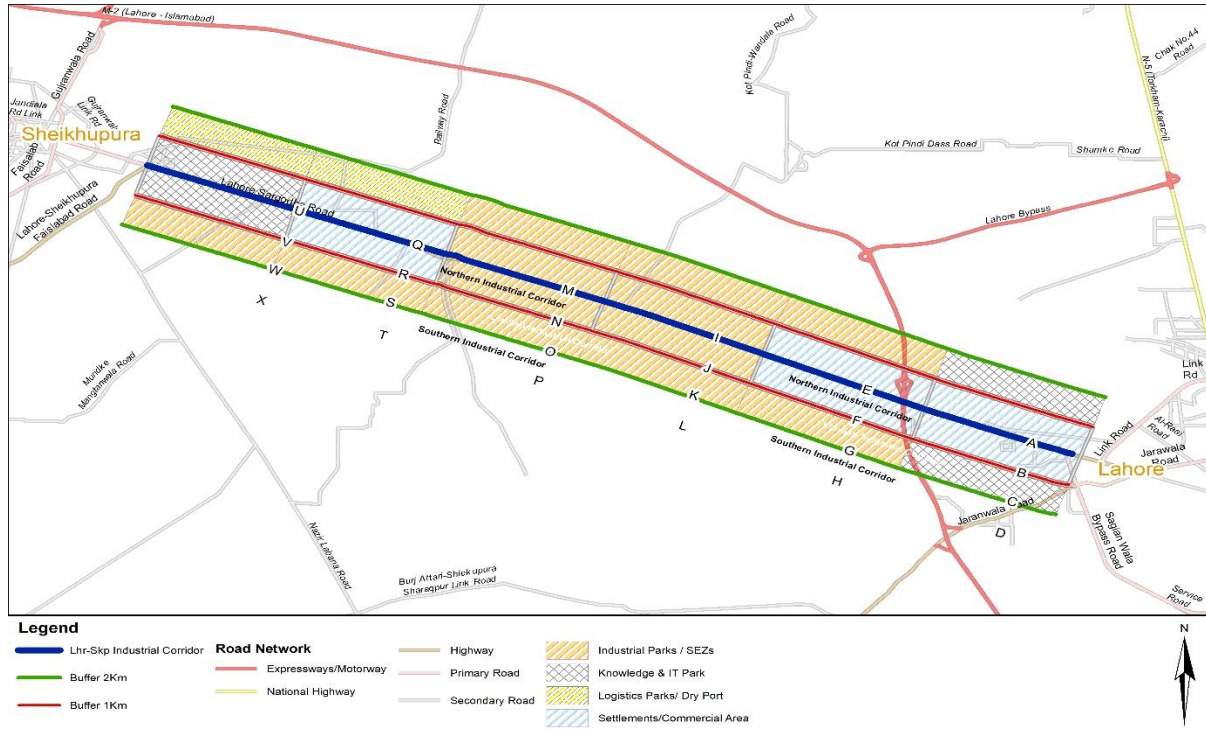
Since their inception, the economic activity generated through the corridor development has been able to create a significant number of jobs. As of 2012, 0.635 million jobs were created out of a total target of 5.44



certain regulatory instruments. The whole corridor shall be divided into different spatial units keeping in view the prevailing dynamics and potential upgradation. For instance, north-west part of the corridor is highly suitable for Dryport and logistics as

Figure 2.38 Lahore-Sheikhupura corridor development plan

the Railway network is in the proximity and the availability of QAAP in the vicinity. Similarly, Knowledge and IT Parks shall be developed in outskirts of both Lahore and Sheikhupura cities.



Source: Census of Manufacturing Industries 2015-16 and Urban Unit

2.4.4 Industrial Clusters

Policy Recommendations

- On priority, high potential and exiting Industrial Corridors should be identified and supported to promote the agglomeration and growth
- To transform the existing industrial-corridors-to-economic-corridors, the respective and local authorities should set a vision for each corridor with a spatial layout for focused development
- Every potential economic corridor shall be attracting most conducive and competitive sectors only while focusing jobs and exports
- All the required infrastructure and investment support shall be extended in integrated manner to optimize the corridors 'growth
- The appropriate area along the every selected corridor shall be declared as per the long-term plan to achieve the envisaged goals
- All the major industrial parks and zones (SEZs) should only be allowed to develop along the high potential corridors instead of choosing a satellite location which requires all the infrastructure support from very a basic level i.e. roads.
- Governments should open-up its development drives by collaborating with private sector and foreign investments, under PPP mode, to develop the corridors in a more sustainable and efficient manner
- Potential transport and logistics corridors shall also be supported to upgrade and attract industries

Competitive Industrial Clusters are often emphasized with the comparative advantages of a specific location which attracts and maintains industrial growth, while transferring knowledge and other important spillovers, in the local economy. Punjab needs to focus on Industrial competitiveness and Clusters, in particular. Undoubtedly, SEZs are also very important and trigger the economic growth but clusters' development is comparatively more important to make industrial development more sustainable and inclusive as SEZs operate in more technology and require capital-intensive sectors, greater government support, foreign direct investment (FDI), and stronger links to the global market. While creating new clusters along the high potential corridors, Punjab shall also transform its existing clusters to get them matured. Presently, there are various clusters in Punjab which are either trapped in emerging-to-growth stage or facing premature declining.

Apart from traditional and historical clusters, Punjab has not achieved much in developing new clusters. To strengthen planning and guidance, the PSS to leverage on the existing comparative advantages of the province in developing new clusters in the new sectors and locations. For developing new clusters, the strategy is focused on how the province can maximize its resources' utilization for gardening the economic agenda through agglomerations and competitiveness



while fostering the sustainability alongside. Following are the key policy guidelines, the PSS shall employ in developing clusters.

Policy Recommendations

- **Strengthening Planning and Support:** To promote clustering, specific locations should be declared optimal for specific industrial sectors based on Punjab's comparative advantages. Proper industrial spaces should be demarcated and incorporated in urban centre plans to promote systematic growth of clusters near major markets and skilled labor pools. Further agglomeration in spontaneous and non-clustered industry growth should be promoted through provision of infrastructure and other incentives specific to the locations. Provision of better infrastructure such as a more connected road network is essential to stimulate the formation of sustainable clusters and to ensure a higher concentration of firms within the clusters.
- **Proper Guidance and Facilitation:** Public and private sector cooperation is essential for the establishment of sustainable and effective clusters. The public sector needs to play a facilitative role in terms of providing better information and assistance to the private investors and entrepreneurs. Special emphasis should be laid upon raising awareness regarding latest and more efficient technologies and production methods.
- **Skills Development and Labour Productivity:** Establishment of technical universities and training institutes in locality of the major clusters for imparting modern specialized skills to labor and managerial knowledge specifically for that sector. To tackle the issue of low investment on human capital development due to low profitability of a firm, the firms in a cluster should be encouraged to cooperate and develop a shared pool of skilled labor specialized for that sector.
- **Adequate Financial Support and Incentives:** The government has to work towards providing a viable financing solution for the SME's to allow them upgrade their technology and expand their operations. Such a financing option is also essential for budding entrepreneurs. Capital financing for fixed investments from the banking sector is crucial for the growth of SME's in the industrial sector. Risk mitigation measures should be taken for the

banking sector when loaning to SME's in order to instil lending confidence.

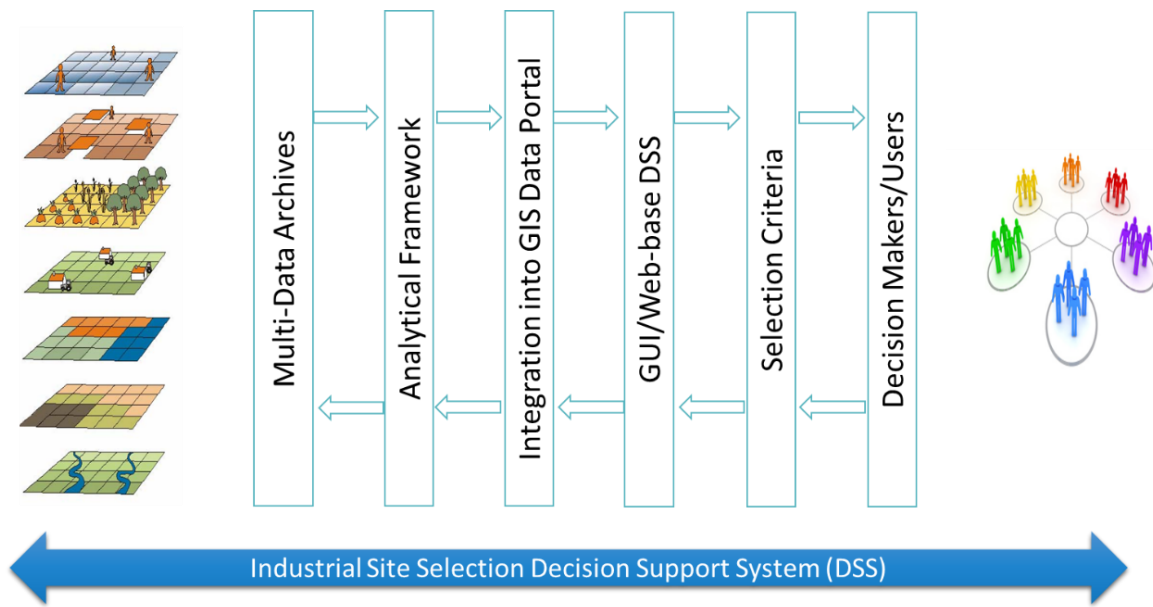
- **Aligned Institutions and Exports Promotion:** Government should encourage especially the exporting firms to produce and export higher value added products. Firm owners should be given awareness regarding financing options for expansion. Measures should be taken to make the exporting clusters more competitive in the global context. Facilitative bodies may be established in the vicinity of the major domestic and export clusters to promote cooperation between clustered firms. Awareness regarding the cooperation of firms to intensify the benefits of agglomeration economies, in the best performing regional clusters, should be given to local firms.

2.4.5 Industrial Parks, Estates & SEZs

As per PSS findings, the positioning of the Industrial Estate/Zone is highly critical and shall be done after diligent review and meticulous assessments of the potential sites. For example, Industrial estates in Bhalwal and Vehari could have presented a different results if the site selections were made appropriately. Government has been allocating large investments in providing infrastructure and related amenities to the industrial zones and clusters. On the contrary; however, there had been no evidence based support system developed yet that may help to inform and optimize the impact of such investments. Taking the above as an evidence, it could be stated that an evidence-based system shall help in improving the feasibilities and competitiveness of the most suitable sites. As being performed under PSS, such systems shall also extend support in phasing-out the unscrupulous attempts towards unfeasible sites to transform into feasible ones which may not be a prudent spending. To overcome such challenges of poor site selection, taking support from various empirical findings and literature suggestions, a multi-dimensional and comprehensive framework is developed to enable Punjab with an evidence based decision support system (DSS). Following is the brief schema;



Figure 2.40 Industrial site selection decision support system



Source: Urban Unit

A fully integrated dashboard enlisting all the data and information, on industrialization fabrics in Punjab, shall be developed which will facilitate all the industry aspirants and policy makers in informed decision making. DSS shall provide all the required evidences covering mainly physical infrastructure, technical aspects and socio-economic information across Punjab and detailed assessment of corridors and potential sites

within key Economic Regions. Users, by the support of DSS, shall be equipped to view and analyze potential sites by running tailored queries on a web-based dashboard which to be guided by several case-studies based on the developed set of analytical frameworks and GIS layers. Following is the brief illustration on how the DSS will enable the Multi-Criteria to select sites from;

Figure 2.41 Site selection framework

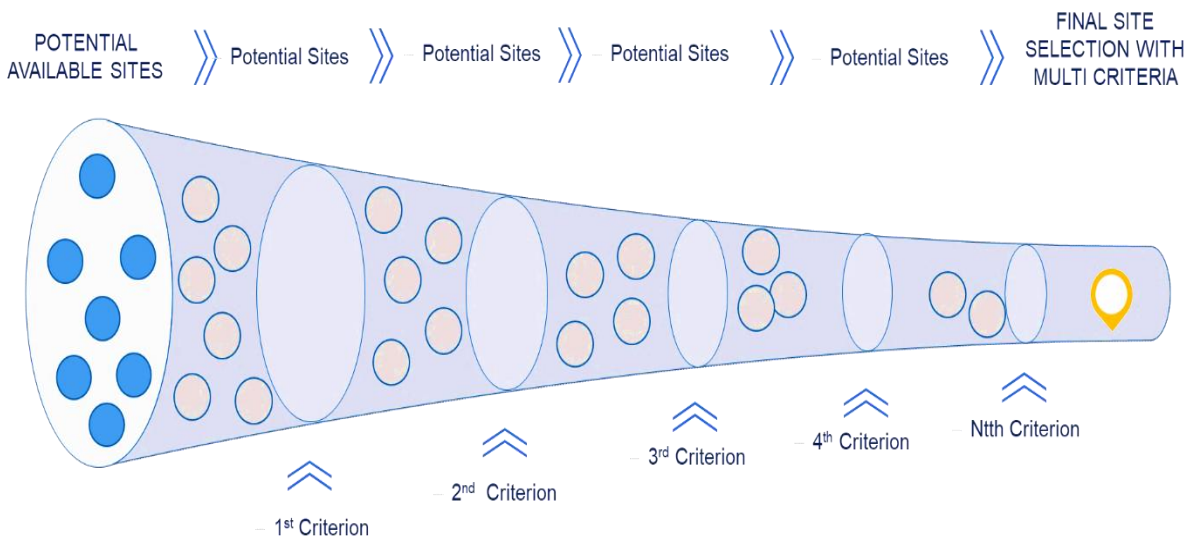




Figure 2.42 Identification of potential sites using multi-criteria analysis

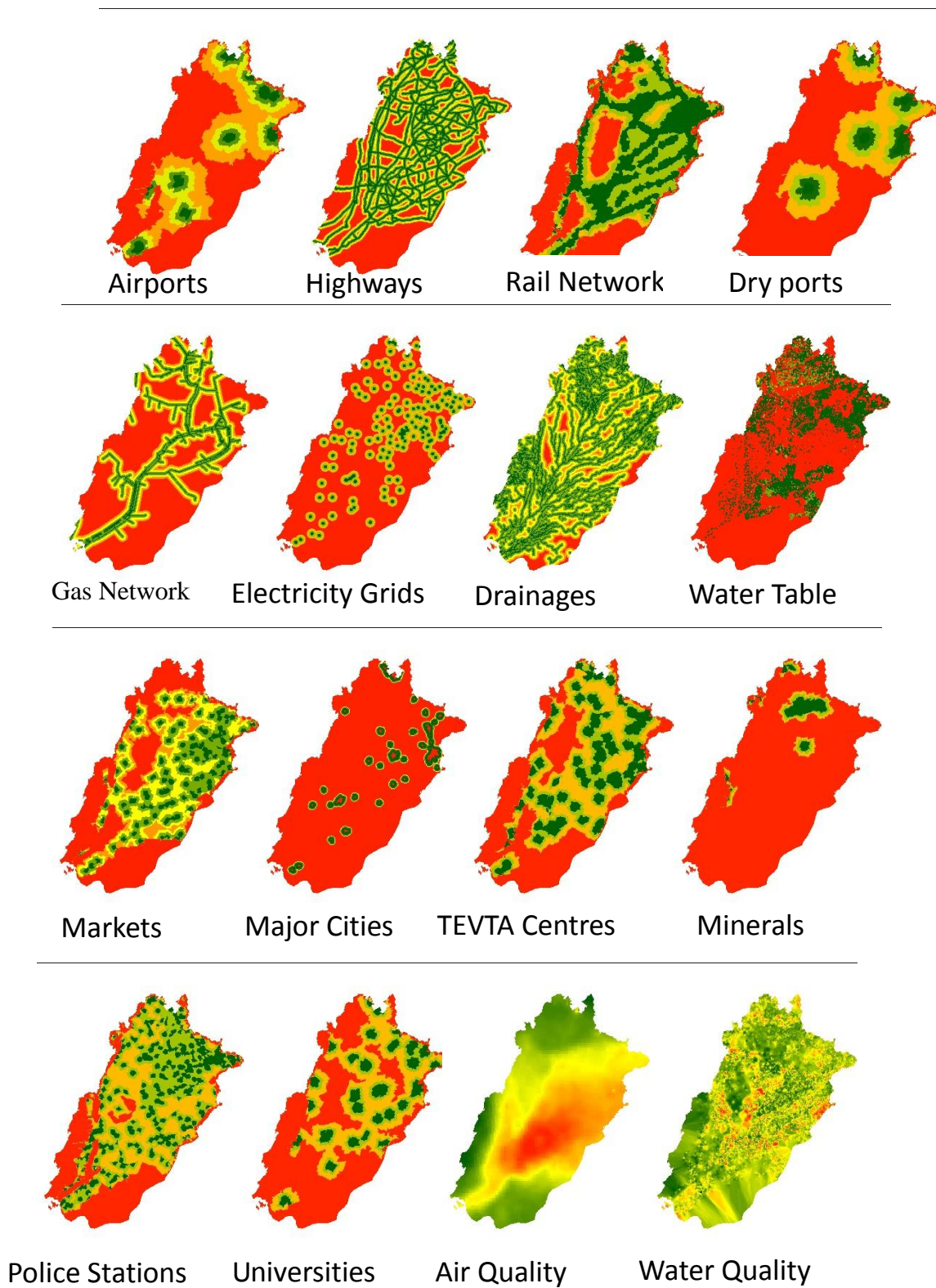
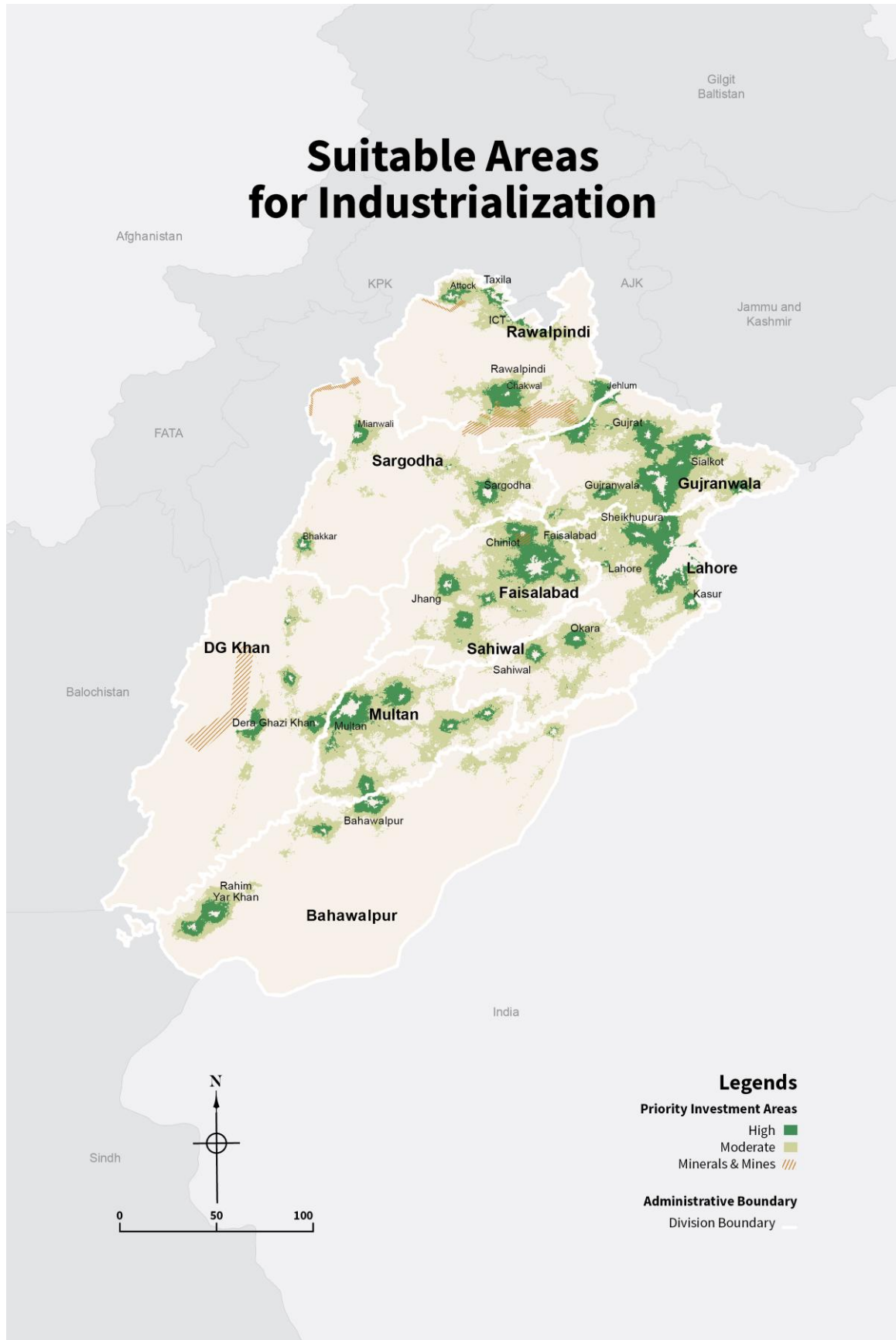




Figure 2.43 Potential industrial development locations using multicriteria



Source: Urban Unit



Future Industrial Parks/Zones in Punjab

For anchoring the development of industrial zones in the Punjab to make the Industrial sector more significant, PSS proposes a development mechanism to harness its strategic objectives as well as development at the same time. For this purpose, the Province should adopt different typologies and development schemas for the Industrial zones. Table 2.15 depicts the types, thrust areas and their appropriate locations.

BOX 2.4 Vietnam's Industrial Zones

Vietnam has truly embraced the industrial zone model of industrial development. Favourable policies and sustainable industrial planning has been able to attract a considerable FDI for the development of industrial zones. As of mid-2016, the industrial zones of Vietnam have been able to attract over US\$ 150 Billion in foreign investment which accounts for around half of the overall foreign investment in the country.

INDUSTRIAL ZONES IN VIETNAM

325+ Industrial Zones

- 325 IE's have been setup as of 2016
- 220 of these are already operational covering an area of 60,900 ha.
- Majority of the land designated for leasing as industrial land

High Occupancy

- Vietnam has been able to achieve an occupancy of 51.5% in the overall Industrial Zones.
- Occupancy in the operating Industrial Zones is as high as 73%

The development of an overarching spatial plan for the industrial zones has been an enabling factors for the success of the industrial zones in Vietnam. Several factors are considered when deciding where to locate the industrial estates including; 1) Geographic location based on core regional competencies, 2) Proximity to cheap labour, 3) Availability of enabling Infrastructure and utilities, 4) Government incentives.

Source: Vietnam Briefing, 2017

Table 2.15 Thrust areas and appropriate locations

Type	Main Thrust areas	Size	Prospective Investors / and Linkages	Appropriate Locations
Mixed Manufacturing	Labor Intensive & high value-added export oriented sectors	Above 50 Acres	Largely local entrepreneurs in collaboration with foreign investors leveraging CPEC opportunities.	In the outskirts of top-ranked Gateways, Hubs and on the Industrial Corridors
Sector Specific	Competitive sectors and Strategic reasons	Above 100 Acres	Largely from foreign investors, GVCs and Pakistan's diasporas.	In the proximity of existing Industrial Clusters, outskirts of Gateway Cities or on the Industrial Corridors
Technology & Research (Technopoles)	Skill-Intensive, Innovation-focused and Strategic reasoning	Above 25 Acres	GVCs interacting in Hi-tech sectors and Foreign Investors leveraging CPEC	Lahore, Rawalpindi, Faisalabad, Gujranwala, Multan and on their key Industrial Corridors
Software & IT	Export oriented, Skill-Intensive, and Digital transformation	Above 10 Acres	Pakistan's Diasporas, Local Entrepreneurs, Foreign Investors especially Global Tech firms	Lahore, Rawalpindi, Faisalabad, Multan
Agro-based processing & Value Additions	Food processing, Value Additions, Regional Development And Improved Industrial linkages for competitiveness	Above 50 Acres	Local Entrepreneurs, Foreign Investors especially Chinese FDI	Either in the Suburbs or on main Corridors of: Attock Bhakkar Sargodha Gujranwala Shiekhupura Faisalabad Sahiwal Multan RY Khan Bahawanagar Bahawlpur Rahim Yar Khan
Logistics & Cargo	State-of-the-art warehousing, logistics handling and exports' processing	Above 50 Acres	Largely foreign investments leveraging CPEC opportunities.	Either in the Suburbs or on their main Corridors of all Primary, Secondary and Tertiary Gateways of Punjab



Financial & Support Services	Allied services, Financial centres and business support	Above 25 Acres	Both Local and Foreign companies with global linkages.	Within Urban centres of Lahore, Rawalpindi, Faisalabad, Multan, Sialkot
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Source: Urban Unit

Policy Recommendations

- **Location selection and future SEZs:** Industrial zoning shall be promoted and developed in the high-potential areas for selected sectors only as it is not wise to support the policy that every district to have an Industrial Estate to house very a basic-level domestic-oriented industry with minimum economic gains. Location of new industrial parks/zones should be determined through evidence-based criteria after identifying optimal locations which are conducive for industrial development and limit the pressure on public exchequer at the same time.
- **Optimizing the existing infrastructure and advantages:** Priority development of future industrial zones along the corridors where significant industrialization has already taken place, such as the Lahore-Sheikhupura road should be declared as industrial zones to promote further colonization along these corridors which are already optimal locations for industrialization. Similarly, future industrial zones should be located along major highways and CPEC routes. Assessment should be made of the all high-potential sites to make them more competitive with appropriate infrastructure development and support.
- **Provision of Adequate Infrastructure:** Allied infrastructure should be made available in the proximity of high potential areas and demarcated zones, especially training centers and housing facilities to ensure a ready supply of skilled labor to the firms. All industrial zones and SEZs should be provided with adequate connectivity and logistics support enhancing access to markets, labor and materials. A standardized basic development plan should be devised for all future industrial estates/SEZs which includes 1) dedicated grid station and power generation 2) gas network 3) water supply 4) modern sewerage facility 5) public and other important institutions 6) dedicated training center.
- **Promotion and Facilitation:** Establishment of one-window cells in all industrial estates/SEZs to facilitate investors through the process of purchase of land and obtaining electricity and gas connections. Regulatory mechanisms should be put in place to prevent profiteering by real estate agents driving up the price of land.

2.5 Infrastructure and Support Framework

For a successful transformation of Punjab through Industrial development, Punjab requires state-of-the-art infrastructure. The infrastructure development should focus on both soft-side and hard-side elements. Creation of above a million jobs per year is not possible without an integrated support mechanism that supports the Industrial competitiveness and growth. Punjab, through PSS tools, shall align its infrastructure using following principles;

For soft-side Infrastructure, Punjab to have a very competitive and attractive policy support with focused incentive mechanism. Following are the key focus areas of interventions the Government shall devise solutions on the priority:

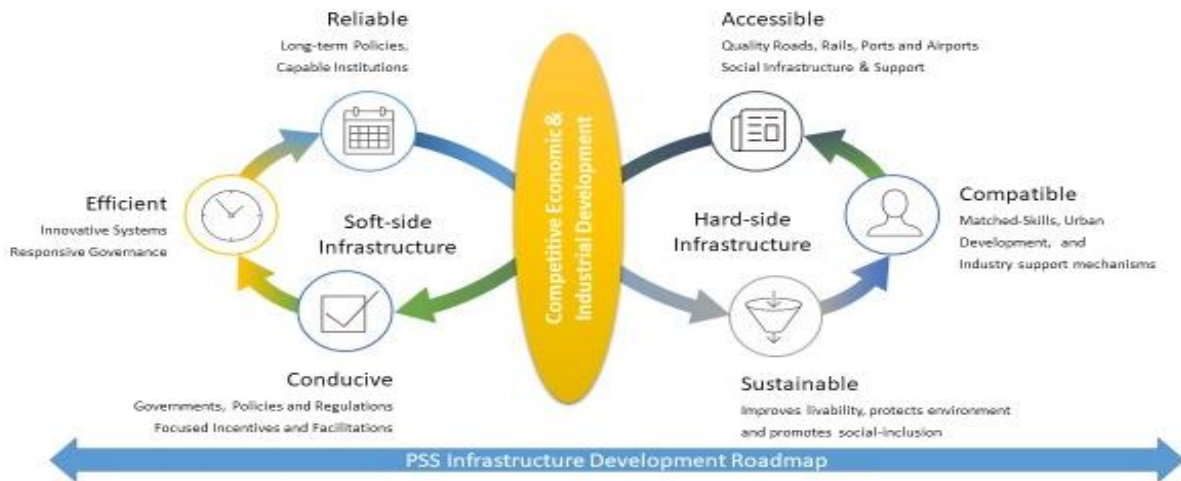
- Reducing the cost of doing business to provide the Punjab Industry an edge in international markets with special attention to rising energy prices and multiple taxes
- Development of an Industrial Regulatory Authority to regulate and facilitate the industries investment and operations in Punjab
- Institutional support to harness full potential and attract foreign investments

For hard-side Infrastructure, Punjab to align all its physical infrastructure to promote and support high growth potential areas. Following are the key focus areas of investments; the government shall develop to make Punjab's industries more competitive:

- Development of integrated connectivity and logistics infrastructure for the high potential corridors clusters and SEZs
- Adequate skills development infrastructure shall be developed to make the youth compatible with the industrial development and innovation
- State-of-the-art social infrastructure including housing, hospitals, community centres across Punjab for achieving a sustainable and inclusive Industrial development
- Green belts and sustainable infrastructure shall be deployed to protect the environment, eco-system and natural ambiance



Figure 2.44 PSS infrastructure development roadmap



Source: Urban Unit



ANNEXURES

ANNEX I: ELLISON GLASER INDEX CALCULATION

One of the many indicators of measuring agglomeration is via Ellison Glaser Index. This index assumes that plant make decisions related to location to gain from the benefits of internal and external economies specific to a certain location. Ellison Glaser Index is defined as:

$$Y_j = \frac{\sum_{i=1}^M (s_{ij} - x_i)^2 - (1 - \sum_i x_i^2)H_j}{(1 - \sum_i x_i^2)(1 - H_j)}$$

Where S_{ij} is defined as the share of industry j in a district i , x_i is denoted as the share of industry's overall manufacturing employment in district i , $(s_{ij} - x_i)^2$ is known as the Gini coefficient measuring raw geographic concentration by the sum of squared deviations of employment shares of industry's j . $H_j = \sum_k Z_{kj}^2$ is a Herfindahl-style measure of the industry j 's plant level concentration of employment where Z_{kj} is the k th plant share in industry j 's employment.

Ellison Glaser Index Shows the concentration of manufacturing sector. Sectors with score greater than .05 are agglomerated, score .02 to .05 are moderately agglomerated and less than .02 are considered as randomly dispersed. In Punjab at 2 digit "Other Manufacturing" is on top and agglomerated, this sector mainly consist on sports goods, surgical equipment and jewelry items. Out of 23 sectors 15 sectors are agglomerated, geographically concentrated to few districts, 7 are moderately agglomerated and only one sector is randomly dispersed.

Table 2.1A: Cluster profile of Punjab's industrial sectors

Punjab				
Technology	Sector 2 digit	EGI	Status	Freq.
Low Tech	Other Manufacturing	0.65	Agglomerated	3,288
Low Tech	Tobacco Products	0.61	Agglomerated	12
Hi tech	Computer, Electronic And Optical	0.30	Agglomerated	62
Hi tech	Basic Pharmaceutical Products	0.23	Agglomerated	291
Medium High Tech	Other Transport Equipment	0.21	Agglomerated	341
Medium High Tech	Fabricated Metal Products	0.20	Agglomerated	4,004
Medium High Tech	Electrical Equipment	0.20	Agglomerated	1,073
Medium High Tech	Motor Vehicles, Trailers	0.19	Agglomerated	737
Medium Low Tech	Basic Metals	0.18	Agglomerated	1,181
Low Tech	Wood And Of Products Of Wood	0.15	Agglomerated	1,429
Low Tech	Leather And Related Products	0.12	Agglomerated	1,275
Low Tech	Wearing Apparel	0.10	Agglomerated	2,500
Low Tech	Textiles	0.09	Agglomerated	11,258
Medium Low Tech	Rubber And Plastics Products	0.08	Agglomerated	1,737
Medium Low Tech	Other Non-Metallic Mineral	0.08	Agglomerated	4,601
Medium High Tech	Machinery And Equipment N.E.C	0.05	Moderate Agglomeration	2,036
Low Tech	Furniture	0.05	Moderate Agglomeration	2,775
Low Tech	Printing And Reproduction Of Re	0.05	Moderate Agglomeration	965
Low Tech	Beverages	0.05	Moderate Agglomeration	121
Medium High Tech	Chemicals And Chemical Products	0.04	Moderate Agglomeration	679
Low Tech	Paper And Paper Products	0.03	Moderate Agglomeration	785
Low Tech	Food Products	0.03	Moderate Agglomeration	5,163
Medium Low Tech	Coke And Refined Petroleum Prod	-0.08	Randomly Dispersed	44
	Total	0.14		46,357



ANNEX II

Table 2.2A: Variables used for determining district ranking⁵

Dimensions	Weights	Indicators
Raw Materials	14.97%	Food Crops, Vegetables, Fruits, Cash Crops, Fisheries, Livestock, Forest, Potential Explored, Oil Production, Gas Production, Minerals
Market Potential	12.31%	Population, Electricity Consumption, Middle aged proportion, Nightlight Intensity, Urban Population, Electricity Growth, Cities Growth, Urbanization, Economic Situation, Middle/U. Middle class, Retail Market, Disposable Income, Road Density, Mobile Access, Telephone Access, Computer Access, Crime Rate, Floods, Bank Account, Economic affairs Spending
Human Capital	12.30%	Primary education , Secondary education, Arithmetic ability, Tertiary education, TEVTA enrollment, DAE passing candidates, On-job vocational training, Engineering programs, High-tech employment, Quaternary education, Top universities, DAE toppers %age, Industrial employment, Gender gap, Life expectancy, Immigration inward, Immigration outward
Enviro Eco	12.26%	Rainfall, Temperature, Foggy days, Forest, Topography, Uncultivated Land, Soil texture, Surface water, Flood Incidences, Ecological levels, Earth quake, water quality(TDS), NO2 air quality
Institutional support	11.71%	Division Capital, Chambers, Associations, TEVTA Institutes, NAVTTC, Industrial Estates, WASA, DISCOs, SNGPL, RTO & Collectrates, Police Stations, Non-development budgets, Government Banks, Commercial Banks, Cabinet representation (Fed), Cabinet representation (Punjab), Judiciary Performance, ADRs, No. of courts
Connectivity & Logistics	10.53%	District Roads, Provincial Highways, National Highways, Motorways, Dry Ports, Airports, Railway Stations, GF agencies, BB workshops, Bus Terminal, Cold Storages, Trucks/Carriers, POI, Neighbors, DSL
Utilities	9.13%	Grid Stations, Generation Capacity, Gas Pipeline, Gas Network, Electricity Network, Sanitation/Sewerage, Water Supply, Water Table, Electricity Quality, Gas Quality, Ground Water Quality
Industrial Progress	9.08%	Intensity of industry, Concentration of industry, Diversification of industry, Operationalization of industry
Community	7.70%	Sub-indexes of Education, Health, Wash, Gender, Economic, Social

⁵ Principle Component Analysis (PCA) is used to assign weights to each variable and dimension