i) Punjab Cities Governance Improvement Project (PCGIP)

- 5 large cities (2012-17): Focused on strengthening of systems and governance improvement for enhanced service delivery, to support cities in strengthening systems for improved planning, resource management, accountability, and to improve the capacity to respond promptly and effectively to an Eligible Crisis or Emergency.

ii) Punjab Intermediate Cities Improvement Investment Programme (PICIIP)

- 12 intermediate cities (2016-25):
  To resolve urban development challenges by ensuring integrated planning, improved institutional framework, transparent business procedures, strengthened urban infrastructure and improved service delivery in the intermediate cities.

iii) Punjab Safe City Initiative:

- The Government of Punjab established Safe Cities Authority (SCA), under the Punjab Safe Cities Ordinance 2015, to ensure establishment of an integrated command, control and communication system for Police in major cities of the province for public safety. Safe City is a concept for returning security and quality of life to today’s complex cities through the use of technology, infrastructure, personnel and processes.

iv) Smart Cities:

- Under the concept of smart cities, Punjab has introduced a number of initiatives through which it maximized the efficient use of technology for good governance and better service delivery. Some of these include modern transportation infrastructure like Metro Bus Service, smart monitoring of schools and healthcare facilities and dengue activity tracking system, e-vaccination program, GIS-based mapping and automation of the Urban Immovable Property Tax (UIPT) system, solid waste management, citizen facilitation centres and above all, increasing efficient use of technology by police for smart policing.

v) Metro System in Punjab:

- With the aim to provide safe, efficient and comfortable urban transportation system in the major cities of Punjab; 3 large metro bus service has been initiated in major cities i.e. Lahore, Rawalpindi-Islamabad and Multan. In addition, Pakistan’s first modern rail-based mass rapid transit “Orange Line” is an under-construction project in Lahore.

vi) Waste Management Companies in major cities:

- Following successful establishment and operationalization of Lahore Waste Management Company, six solid waste management companies have been established in major cities of Punjab i.e. Faisalabad, Gujranwala, Sialkot, Rawalpindi, Multan and Bahawalpur. Companies are fully operational and have taken over the functions of solid waste management in their respective districts. These companies are committed to making their respective cities cleaner places to live in by motivating citizens to reduce waste, increasing awareness about waste management, creating safe disposal sites and collaborating with international agencies for knowledge sharing.
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### 7.0 Introduction

High quality and efficient infrastructure is critical to the development of industrial, agricultural and services sector. It is considered the foremost factor that determines the economic growth of the country and its relevance in every sector of the economy is well known. From the provision of health and education services, ensuring interregional connectivity to the provision of public services for households and industry, the importance of infrastructure is evident.

It is a well evident fact that infrastructure matters to growth, especially when the Province is among the most rapidly urbanizing provinces in the region. There is, indeed, some anecdotal and more technical evidence that improved quantity and quality of infrastructure can directly raise the productivity of human and physical capital and consequent growth. For example, the quality roads infrastructure can: i) improve access to education and health services, ii) improve access to markets for farmers, by cutting costs, iii) facilitate private investment, and, ultimately improve jobs and income levels for many.

Notwithstanding the fact that infrastructure, especially in urban areas, have a direct and strong relationship with the growth of Punjab, the debate still exists on “which infrastructure matters, and when”? The Planning and Development Department (P&DD), Punjab categorizes infrastructure development among highways (roads, bridges, flyovers, etc.), public transport (mass transit solutions), water resources (irrigation infrastructure), public health (water supply, sewerage, water treatment plants and solid waste), housing (multipurpose housing and low-income housing), and energy (thermal, hydel, solar, biomass, wind etc.). The challenge is thus to prioritize the infrastructure development projects, which make the most difference in the overall growth and development of the province.

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**Figure 1: Infrastructure development**

![Diagram of Infrastructure Development](image)
In the backdrop of rapid urbanization, it is critical for the Government of Punjab to make informed decisions on its urban and infrastructure development policy, appropriate and effective institutional arrangements for implementation of its policy and continue learning and adoption from its approaches. This chapter provides an evidence-based assessment and recommendations on the: i) alignment of Punjab’s urban and infrastructure development policies with Punjab’s Growth Strategy; ii) assessment and prioritization of infrastructure and urban development needs, and iii) key recommendations to improve the focus of policy, regulations and public investments towards more sustainable urban development.

7.1 Alignment with Punjab’s Growth Strategy

The Punjab Growth Strategy sets out a robust agenda for the social and economic development of the Punjab Province. All the development considerations and decisions need to be aligned with this overarching development framework of Punjab. The Punjab Economic Report provides a structured approach to understand and establish linkages of infrastructure and urban development initiatives with the critical outcomes and targets of Punjab’s Growth Strategy.

7.1.1 Urban Infrastructure and Growth

Sufficient evidence exists that a 1 percent increase in the stock of infrastructure is associated with a 1 percent increase in the Gross Domestic Product (GDP) across all countries1. However, to achieve this level of growth in the GDP, it is important that as countries develop, infrastructure must adapt to support changing pattern of demand, as the shares of power, roads, and telecommunications in the total stock of infrastructure increase. Today, cities occupy just 2.6 percent of the earth’s crust, but are home to more than 50 percent of the world’s population, generate more than 80 percent of the world’s GDP and use 75 percent of the world’s natural resources2. The UN estimates that our global population will rise to 9.6 billion by 2050. The majority of this growth will occur in cities, with an estimated 66 percent of the global population living in urban areas by 2050. Cities are evolving faster than at any point in our history, putting them on the cusp of major transformation which, if managed well, could lead to unprecedented economic growth and prosperity for all, but if managed in an uncoordinated manner could drive social, economic and environmental decline.

Urbanization – Pakistan and Punjab

Of Pakistan’s current population of about 207 million, over 36 percent live in urban areas and of which the majority of the urban population dwells in or near eight cities – Karachi, Lahore, Faisalabad, Rawalpindi, Multan, Hyderabad, Gujranwala and Peshawar. It is anticipated that by 2030, half of the country’s population will be living in cities and that 12 cities have a population of one million. Punjab is among the most urbanized regions of South Asia and is experiencing a consistent and long-term demographic shift of the population to urban regions and cities with around 36 percent of the population living in urban Punjab. The projections estimate that urban population in Punjab will rise to about 52 million by 2025 and 59 million by 2030. While Lahore, the capital of Punjab and its largest city, is currently home to about 11 million people. Punjab has four other cities with populations in excess of one million, namely Faisalabad (3 million), Gujranwala and Rawalpindi (2 million each), and Multan (1.8 million). Collectively, about half of the urban population in Punjab is concentrated in these five cities. The concentration of wealth in the cities is also increasing as Pakistan’s cities contribute 78 percent to the country’s GDP. The evidence suggests2 that 1 percent increase in urbanization leads to a 1.1 percent increase in the economic growth rate.

Urban environments and services are increasingly stressing as cities population growth is exceeding the government’s capacity to keep pace. And if cities are unable to absorb, comfortably accommodate, and meaningfully employ rural-to-urban migrants, this will exacerbate the social/ethnic tensions between ‘native’ and migrant populations. The Punjab Growth Strategy identified the private sector as a key driver for the growth in the province. This, however, can only be achieved by capitalizing on growing urbanization in Punjab. Urban development can benefit from values of ‘density’ and ‘agglomeration’, which provides an enabling environment for achieving economic development, higher productivity, social equity and human development. To make Punjab competitive for investment and development, cities are going to play a vital role, because they can benefit from a large and skilled labour force, economies of urban scale, economies of agglomeration (i.e. efficiency resulting from clustering of firms in a given industry or related industries), and the resulting demand for goods and services. In addition, the rural-urban migration and urbanization can only lead to higher income if manufacturing and services grow fast enough to absorb the supply of labour.

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1 The World Development Report, 2011
2 Future of Urban Development Services, World Economic Forum
As the population growth in 5 major cities of Punjab is exceeding government and private sector capacity, to keep pace, it is important for Punjab to invest in other (intermediate) cities at the same time to ensure a more geographically balanced rate of urbanization and the creation of a system of cities – an efficient network of urban centres whose manufacturing and services industries are connected. Harnessing and promoting this approach of “system of cities” will lead to faster job creation and higher growth of productivity.

**Punjab’s Infrastructure and Urban Development Policy**

The Punjab Growth Strategy 2014-18 sets out an ambitious agenda for development in Punjab, with an economic growth target of 7-8 percent and job creation of over 1 million every year. These targets can only be achieved by making smarter investments in the public sector; which not only create direct social and economic impact but also support improved conditions for broad-based economic growth, private sector investments, employment opportunities and poverty alleviation. Sufficient evidence exists that both urbanization and investment in infrastructure lead to an increase in the economic growth rate. An increase of 1 percent in urbanization leads to a 1.1 percent increase in the economic growth rate³.

Considering the direct and significant impact of infrastructure and urban development, the Punjab Growth Strategy considered urban development at the centre of Punjab’s approach to economic growth. And this has several absolute advantages. Firstly, dense multi-function urban areas create jobs and are free from barriers to entry and exit. Secondly, density attracts investment and helps the growth of the construction industry as well as commerce, both of which are employment friendly. In addition, large cities benefit from a large and skilled labour force, economies of urban scale, economies of agglomeration (i.e. efficiency resulting from clustering of firms in a given industry or related industries), and the resulting demand for goods and services.

The Government’s Medium-Term Development Framework (MTDF) 2016-19 incorporates the Urban Development agenda and seeks to develop modern and efficiently managed urban centres to serve as engines of growth for the provincial economy. The key priority areas within the sector include; supply of potable drinking water and its efficient use; provision of effective and efficient sewerage and drainage system; environment friendly disposal of sewage; safe and efficient roads infrastructure; provision of solid waste management services; strategic planning for growth of cities on scientific lines including efficient land use planning and regulatory building controls.

The Government of Punjab has also developed this Urban Development Sector Plan to determine outcomes, objectives, priorities and programs till 2018. These programs will then be reflected in the various Administrative Departments’ Annual Development Programs (ADP) till 2018. In order to achieve the objectives of the Punjab Growth Strategy 2018, the sector plan for the Urban Development has been developed by active coordination of HUD&PHED Department, LG&CD Department, Transport Department, LDA, the Urban Unit, PMDFC and PHATA which provides a clear link between identified outcomes, outputs and inputs for the following sub-sectors:

- Housing and Urban Planning
- Water and Sanitation in Urban Areas
- Urban Solid Waste Management
- Public Transport

7.2 Performance Review of the Road Infrastructure

The graph above shows the ADP allocations to the road sector over the years. Apart from a small dip in 2014-15, the budgeted allocation has increased in all years. In 2015-16, there was a sharp increase, with the budgeted allocation more than doubling from the previous year. One reason for the sharp increase in 2014-15 was the introduction of the Khadim-e-Punjab Rural Road Programme (KPRRP) programme phases I and II. The budgeted ADP in 2016-17 is Rs 78,989 million, which is greater than the amount for any of the previous years. The ADP 2016-17 includes the phase III and IV of the KPRRP as its most major scheme in terms of cost.

The revised allocations have followed a similar trend like the budgeted allocations. Since, 2014-2015 the revised allocations have been greater than budgeted allocations, indicating that most planned schemes have been completed and some new schemes have also been introduced during these years.

Figure 3: Percentage Allocation to The Road Sector

Source: Planning and Development Department, Punjab
The graph above shows ADP allocations to the road sector as a percentage of the total ADP. The revised allocation for the year 2016-17 is greater than the allocations in previous years, showing the commitment and focus of the Government of Punjab on improving the road sector. 72 percent of the total revision in the ADP is due to 5 schemes, with Khadim-e-Punjab Rural Road Programme Phase III and IV alone accounting for 32 percent of the revision.

**Major Initiatives and Investments – Urban Development & Infrastructure**

Major Investments of the Government of Punjab are the creation and management of provincial assets in social and economic sectors. The management of the provincial assets is generally through the current budget, whereas creation of new assets is funded through development budget i.e. ADP. The ADP allocations define the priorities of the government and help the government pursue its agenda of social and economic growth. This section of the report involved a review of ADP; with the purpose to identify development priorities of the government and also to assess the relevance of development spending with the Growth Strategy, especially in the area of infrastructure and urban development. In addition, the review examined the ADP allocations among various infrastructure development areas including highways, public transport, water resources, public health, housing and energy.

**Major projects within ADP 2016-17 include**

- Lahore Orange Line Metro Train Project (Rs. 85 billion or 16 percent share within total development spending),
- Saaf Pani/clean water Program (Rs. 30 billion or 5.5 percent share),
- Rural Roads Program (Rs. 27 billion or 4.9 percent share), district / TMA allocation (Rs. 15 billion or 2.7 percent share), and,
- Rehabilitation of urban and rural water supply and sewage system (Rs. 14.4 billion or 2.6 percent share).

**Infrastructure and Urban Development Spending:** The sectoral allocations of the ADP for FY 2016-17 indicate that almost 50 percent of the investments are in infrastructure and service sectors, and a major chunk of these investments are in 5 major cities of the Punjab province. These investments are aimed to respond to growing urbanization in Punjab. The remaining ADP allocations are in the social sector production sector and other sectors.

![Figure 4: ADP Sectoral Shares](image)

Source: Annual Development Programme (MTDF), GoPb
Further, the analysis of ADP investments in infrastructure and urban development reveal that transportation and roads remain a top priority of Punjab during the three years. As mentioned above, the three major projects during FY 2015-16 and FY 2016-17 were the establishment of critical transportation and roads system in 2 major cities of Punjab. The second priority of the government was energy, which is critical for creating an enabling environment for the private sector to grow. This is also well aligned with the broader objectives of the Growth Strategy, as in Punjab’s context the multiplier impact of investments on energy is over 2 percent.

**Figure 5: Investments in Urban & Infrastructure Development (PKR Million)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Urban Development</th>
<th>Roads</th>
<th>Energy</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016-17</td>
<td>16,700</td>
<td>79,000</td>
<td>8,750</td>
<td>185</td>
</tr>
<tr>
<td>2015-16</td>
<td>17,473</td>
<td>69,400</td>
<td>16,000</td>
<td>50</td>
</tr>
<tr>
<td>2014-15</td>
<td>40,683</td>
<td>40,837</td>
<td>22,000</td>
<td>90</td>
</tr>
<tr>
<td>2013-14</td>
<td>13,822</td>
<td>33,937</td>
<td>20,431</td>
<td>154</td>
</tr>
<tr>
<td>2012-13</td>
<td>5,360</td>
<td>26,193</td>
<td>10,000</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Annual Development Programme (MTDF), GoPb

**Major Initiatives – Infrastructure & Urban Development**

i) **Punjab Cities Governance Improvement Project (PCGIP)** – 5 large cities (2012-17): Focused on strengthening of systems and governance improvement for enhanced service delivery, to support cities in strengthening systems for improved planning, resource management, accountability, and to improve the capacity to respond promptly and effectively to an Eligible Crisis or Emergency.

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v) **Metro System in Punjab**: With the aim to provide safe, efficient and comfortable urban transportation system in the major cities of Punjab; 3 large metro bus service has been initiated in major cities i.e. Lahore, Rawalpindi-Islamabad and Multan. In addition, Pakistan’s first modern rail-based mass rapid transit “Orange Line” is an under-construction project in Lahore.
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Major Initiatives and Investments – Environment

In today’s world, the biggest challenge to urban centers and cities is to achieve sustainable development, with balanced social, economic and environmental development. This is equally true for major cities in Punjab where, fast-paced economic and social development has been experienced, but that is partly at the cost of environmental degradation. The factors that contributed to environmental deterioration include uncontrolled urbanization, haphazard industrialization, deterioration of air, surface and groundwater quality, improper disposal of the municipal and industrial wastes. It is, therefore, a well-established fact that the real attainment of sustainable development is through the integration of environmental considerations while achieving the goals of economic growth and development.

Guiding Principles - Sustainable Development

Consequential to the devolution of the subjects of Environment and Ecology in the 18th amendment, the environmental affairs of the province are regulated under the Punjab Environmental Protection Act (amended, 2012). The Environment Protection Department is responsible for the administration of the laws and rules framed under the Act, “for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development”.

The Punjab Environment Policy, 2015 has been approved by the Punjab Environmental Protection Council headed by the Chief Minister Punjab under Section 4 (b) of the Punjab Environmental Protection Act, 1997 (amended, 2012) and is enforced with immediate effect. The objective of the policy is sustainable development in the context of the enhancement of human well-being. The policy aims to protect, conserve and restore Punjab’s environment in order to improve the quality of life of the citizens through sustainable development. In addition, it entails measures to promote economic growth in the region and in improve environmental quality standards in Punjab.

In pursuance of the national and Punjab’s environmental policies, the following environmental protection rules and standards have been introduced for enforcement and implementation.
Punjab/ Pakistan Environment Protection Rules

- Environmental Tribunal Rules, 1999
- Review of IEE & EIA Regulations, 2000
- Certification of Environmental Laboratories Regulations, 2000
- Provincial Sustainable Development Fund Board (Procedure) Rules, 2001
- Environmental Samples Rules, 2001
- NEQS SMART Rules, 2001
- Pollution Charge Rules, 2001
- Provincial Sustainable Development Fund (Utilization) Rules, 2003
- The Punjab Polythene Bag Rules, 2004
- Hospital Waste Management Rules, 2005
- Biosafety Rules, 2005
- Environmental Tribunal Rules, 2012
- Punjab Environmental Protection Base Transceiver Station (BTS) Regulations, 2012
- Punjab Environmental Protection Motor Vehicles Rules, 2013
- Punjab Environmental Protection Administrative Penalty Rules, 2013
- Punjab Bio-safety Rules, 2014

Punjab Environmental Standards

- Punjab Hospital Waste Management Rules, 2014
- Punjab Environmental Quality Standards for Municipal and Liquid Industrial Effluents
- Punjab Environmental Quality Standards for Drinking Water
- Punjab Environmental Quality Standards for Motor Vehicle Exhaust and Noise
- Punjab Environmental Quality Standards for Ambient Air
- Punjab Environmental Quality Standards for Noise
- Punjab Environmental Quality Standards for Treatment of Liquid and Disposal of Bio-medical Waste
- Punjab Environmental Quality Standards for Industrial Gaseous Emissions

7.3 Major Initiatives and Investments

In Punjab, the environmental protection is recognized as an integral part of the social and economic development. Almost all the major/ large development projects have an inbuilt element of environmental assessment and its mitigation strategies. As part of sustainable urban and infrastructure development, a number of initiatives have been taken to make cities more environmentally friendly and lively for the residents. Examples include the establishment of solid waste management companies in major cities of Punjab, the establishment of water recycling plant in Lahore, Faisalabad and Rawalpindi, etc.

Figure 6: Punjab-Budgetary Allocations (PKR Million)

![Figure 6](image)

Source: Annual Development Programme, GoPb
In addition to these special initiatives, the following have been taken to build capabilities of Punjab government to effectively address environmental issues:

i) **Installation of Ambient Air Quality Monitoring Stations in 4 cities of Punjab**: EPA intends to procure and install compact ambient air quality monitoring stations in four cities of Punjab. These stations will monitor ambient air environmental parameters as per the Punjab Environmental Quality Standards. Under this project, air monitoring stations will be installed where there are coal-fired power plants, and in Chakwal where pollution by cement factories is required to be monitored.

ii) **Capacity Building of EPA Punjab for Enforcement of Environment Standards in Punjab including Combined Effluent Treatment Plants (CETPs) and Industrial Estates (IEs) under J&C Program**: This scheme intends to build the capacity of EPA by establishing an Environment Monitoring Resource Centre for the provision of expertise in environmental law and policy and in environmental reviews. Laboratory facilities will be upgraded for analysing environmental samples by realignment and redeployment of human and hardware resources. The labs will also be equipped with monitoring essential/priority PEQS parameters.

iii) **Construction of Model Vertical Shaft Brick Kiln in collaboration with Punjab Brick Kiln Association**: This initiative aims to develop RFP and TOR for the hiring of consultants with a purview to develop detailed drawings, BOQ and specifications for construction of vertical shaft Brick Kiln in Kasur in PPP mode with 20 percent share by private partner and 80 percent share by EPD in collaboration with Punjab Brick Kiln Association.

iv) **Rationalization/Revision and Development of Environmental Quality Standards and Industry-Specific Standards**: Under this initiative, RFP and TOR will be prepared for selection of consultants for rationalization/revision and development of Environmental Quality Standards and Industry-Specific Standards. The recommendations of standards will be prepared for approval by Punjab Environmental Protection Council (PEPC).

### 7.3.1 Leveraging private sector growth through urban and infrastructure development

The public investments in urban and infrastructure development have a direct and positive impact on private sector development. The public-sector investments in urban infrastructure, if planned and managed properly, incentivizes private sector investments by i) directly increasing economic activity, including demand of factors of production for infrastructure development, ii) increasing consumption of residents – thereby increasing aggregate demand and supply, and iii) serving as an input into private sector production, thus augmenting output and productivity. This, however, can’t be considered as an obvious impact of all types of infrastructure, as some have more direct and significant impact whereas others have less obvious and indirect impact on private sector development. For example economic infrastructure in urban centres such as railways, road, transport, telecommunications, gas, electricity, etc. have a much greater impact on private sector investments, if compared with social sector infrastructure such as schools, hospital, housing, etc.

**Table 1: Impact of Public Investment in Urban Infrastructure Development**

<table>
<thead>
<tr>
<th>Public sector investments (urban Infrastructure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Railways, road, transport, telecommunications, energy, environment, etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>More competitive private sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increased productivity &amp; profitability, aggregate demand &amp; supply, increased exports, etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Economic impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Higher economic growth (GDP), income and employment opportunities, better choices and access to public and private sector services</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ultimate impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increased citizens experience and quality of life, assets creation, social and economic empowerment;</td>
</tr>
<tr>
<td>• Strengthened democracy and trust on government, increased government revenue and future capacity to invest</td>
</tr>
</tbody>
</table>
In Punjab, the review of Punjab Economic Growth Strategy, sector plans and ADP investments confirm that Punjab is committed to establishing an appropriate composition of stock of physical infrastructure that can incentivize private sector investments in the urban centres of the province. The Punjab Economic Growth Strategy – as an approach – also considers infrastructure investment as the most efficient fiscal support to provide a near-term boost to the job market. In the long-run, it envisages public investments in infrastructure development as a driver of productivity growth and hence improvement in average living standards. The linkage between infrastructure and private sector-led economic growth involves the following dimensions:

i) Provide input for the private sector: The output of infrastructure sectors such as power, water, transport, etc. are used as inputs for production in the directly productive sectors, viz. agriculture, manufacturing, etc. Therefore, insufficient availability of the former results in the sub-optimal utilization of assets in the latter. In Punjab, the review of ADP 2016-17 confirms that over 40 percent of the development budget is allocated to roads, transport and energy. If we compare the ADP allocations of last five year, it shows a consistent one fourth (1/4) of the budgetary allocations to the physical infrastructure. During the last two years, it increased due to mega infrastructure projects i.e. metro bus in major cities, powerhouses, roads, etc. In addition, the policy and regulatory framework in Punjab has created a huge opportunity for the development of IT infrastructure, which witnessed the highest ever progress during the last decade. Given the availability of these facilities in Punjab, especially in its major cities, it is quite evident that the private sector will grow in the coming years.

ii) Improve productivity: Infrastructure development such as transport and road network improve productivity significantly as it reduces the cost of the production. In Punjab, the growth in services sector, especially trading is an outcome of availability of physical and technological infrastructure. The cost of communications and transportation has been reduced, mainly due to the availability of main highways, motorways, reduced oil/ fuel prices, and better IT-based infrastructure i.e. mobile technology, insurance, banking, etc. It is important for Punjab to have detailed research in this area to assess and estimate the impact of public infrastructure on the private sector development, especially regarding public infrastructure’s contribution to the improvement in productivity and competitiveness of the private sector.

iii) Economic growth with multiplier effect: Physical infrastructure stock development has many important direct and indirect effects on the economy. The direct impact occurs as a result of the transformation of public investments into physical infrastructures such as roads, transport, water and sanitation facilities, education and health facilities, etc. while the indirect impact is created as a result of private sector development and its multiplier impact on the overall economy. It is also known that growing economy leads to increased revenue of governments that are needed to manage and add into existing stock of productive and social assets.

iv) Value addition: The Punjab Economic Growth Strategy 2014-18 identified limited value addition in agriculture, industry and services sector as one of the major reasons for the underperforming economy of the province. The availability of modern infrastructure enables the private sector to become more productive, competitive and specialized in the respective areas, which eventually increases the quality of employment, income level, and value of exports, all of which leads to better performance of the economy and its growth. Various studies have also revealed that around 9 percent of the total value added is contributed by infrastructure services in middle-income countries⁵.

v) Inclusive growth: The linkages of infrastructural development is important not only for economic growth, (vis-a-vis globalization and technological innovation in manufacturing) but also for its impact on poverty reduction. This is however not an obvious impact of infrastructure development; rather it requires more prudent approach towards establishing an appropriate type and level of infrastructure that can influence inclusive growth, whereby lower and middle-income strata of the society can also benefit. In Punjab, the social sector infrastructure such as education, health, water, etc. has proven to be directly benefiting lower and middle-income households. The public investment on energy, technology, transport, roads, etc. have an indirect impact on poor and marginalized segments of the society. It is however important the investments in economic infrastructure should be made to promote such businesses (small and medium enterprises) which accommodate labour from the lower income section of society.

⁵Economic Policy Institute, Briefing Paper on Public Investment - The next ‘new thing’ for powering economic growth By Josh Bivens (April, 2012)

7.3.2 Prioritization of Infrastructure Development Needs

It is widely recognized that good quantity and quality of infrastructure directly contributes to urban development, employment creation and overall economic growth. It is, however, critical to assess and prioritize the infrastructure development needs of the cities. The review of Annual Development Programme (ADP) from 2007-8 to 2015-16 indicated an increasing share of Punjab’s development allocations on roads and public transportation. This has also been a continuing point of criticism on the Punjab Government by the policymakers, academia, media, etc. It is therefore critical to assess the infrastructure development needs of the major cities of the province. This will guide overall Punjab’s infrastructure development policy and priorities, define the basis for ADP allocations to various infrastructure development projects and ultimately improve the impact of such initiatives on socio-economic development. The PER proposed to use various internationally recognized/ used indices (subject to availability of data) to rank 5 major cities against the status of infrastructure and urban development, and thereby identify areas where additional investments are required. These indices are:

The City Development Index (CDI)

The CDI is defined at the city level and used as a measure of average well-being and access to urban facilities by individuals. The high statistical significance and usefulness of the index indicate that it is actually measuring something real. The CDI is actually a measure of depreciated total expenditure over time on human and physical urban services and infrastructure. It is also a proxy for the human and physical capital assets of the city.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>25 x Water connections + 25 x Sewerage + 25 x Electricity + 25 x Telephone</td>
</tr>
<tr>
<td>Waste</td>
<td>Wastewater treated x 50 + Formal solid waste disposal x 50</td>
</tr>
<tr>
<td>Health</td>
<td>(Life expectancy - 25) x 50/60 + (32 - Child mortality) x 50/31.92</td>
</tr>
<tr>
<td>Education</td>
<td>Literacy x 25 + Combined enrolment x 25</td>
</tr>
<tr>
<td>Product</td>
<td>(log City Product - 4.61) x 100/5.99</td>
</tr>
<tr>
<td>City Development</td>
<td>(Infrastructure index + Waste index + Education index + Health index + City Product index)/5</td>
</tr>
</tbody>
</table>

The PER also used these Indicators, excluding the value of ‘city product’, to assess and rank 5 major cities of Punjab. The Index clearly indicates that Lahore is the most developed city of the Punjab province, followed by Rawalpindi. The remaining three score less than 60, which is much below the advanced cities of the Asia and world. As explained in the second graph, it is very much clear that all the 5 cities are quite at par in the health sector. The life expectancy and child mortality in almost the same in all these 5 districts. Whereas in education (literacy and enrolment), the performance of Lahore and Rawalpindi are much better than the remaining three districts. The third defining indicator is of infrastructure, measured by confirming the percentage of the population having access to water connections, proper sewage facilities, electricity and telephone. Again, Lahore succeeded all remaining cities, followed by Faisalabad. The fourth parameter of the index is waste management, measured using wastewater treated and formal solid waste disposal. Lahore is one of the cities which has the best capability to treat wastewater and dispose of solid waste, therefore Lahore scored 61 while the performance of the remaining districts remained poor. The city development index clearly indicated that Lahore, as a city, is at an advanced stage of development, if compared with other major cities of the Punjab province. This is also attributable to the higher public-sector spending/ investments in Lahore if compared to other cities of Punjab.

Figure 7: Punjab-City Development Index (5 Major Cites)
The City Development Index has been used by UN Habitat in 1998, where it assessed and ranked all the major cities of the World, including Lahore and Karachi. The Index, however, has never been assessed at the global level since then. The PER has therefore focused its analysis to only the comparison of major cities of Punjab against each other, rather than with other international cities. In addition, despite the usefulness of the city development index in the assessment of the performance of cities, the index remained unable to suggest if this development is inclusive and sustainable. Given this, the Punjab Economic Report also included analysis of these 5 major cities of Punjab on the ‘indicators for sustainable cities’.

### 7.4 Indicators for Sustainable Cities

A sustainable city can only be one for which the inflow of material and energy resources, and the disposal of wastes, do not exceed the capacity of the city’s surrounding environment. Based upon availability of data on all or most of the following indicators, the PER measured, ranked and compared the 5 major cities of Punjab with averages of international best ratings. The Index is an important progress towards understanding the gaps and in informing policymakers on prioritizing and balancing across various infrastructure development needs of the cities in Punjab.
waste management, creating safe disposal sites and collaborating with international agencies for knowledge sharing. These companies are committed to Punjab i.e. Faisalabad, Gujranwala, Sialkot, Rawalpindi, Multan and Bahawalpur. Companies are fully operational and vi) Waste Management Companies in major cities: Following successful establishment and operationalization of Orange line train service in Lahore has significant potential to improve the use of public transport in these cities. The recent development in Punjab on the establishment of “system of public transit” i.e. Metro service. This has a direct link with the availability of an efficient, economical and reliable public transport in the cities of Punjab, especially in Rawalpindi, Gujranwala and Multan.

agrarian economy to more of an industrial and service-oriented economy. The estimates of persons per square mile indicates that Punjab is shifting from an agricultural economy to an industrialized economy. As a result of urbanization, the demand for resources has increased, and the per capita income has increased significantly. However, trends suggest that urban areas in Punjab will become even denser. High density, to a certain point, is the cornerstone of sustainable urban development as high density brings the efficient use of city resources. For example, it results in less energy use per capita, increased bus ridership, reduced waste production, etc.

iv) Environment: The PER outlined some of the more interesting findings across the five categories:

•  Doctors per capita: In medical care, almost every city increased the number of doctors per capita, with the recent trend being a significant improvement, more teachers and doctors can be hired, and more apartment blocks can be built. The Index confirms the general impression that Punjab’s cities are highly effective in this area.

•  Access to water: Except Faisalabad, all the 4 major cities of Punjab have better access to water than international
averages. There is, however, an increasing threat as the per capita water availability is dwindling with every passing day, with an already dwindled of over 406 percent from 5,260 cubic metres in 1951 to 1,038 cubic metres in 2010.

- Living space (sq.m per capita): Among 5 major cities of Punjab, Lahore falls below the international average of living space i.e. 19 sq.m per capita as compared to the internal average of 23. The rest of the 4 cities have sufficient space if compared with the international average, to accommodate the further population. This clearly indicates that Lahore has consumed almost all of its capacity to accommodate immigrants from other parts of Punjab, as well as Pakistan. The further expansion would lead to a compromising situation in term of density and congestion for the already residing population of Lahore.

- Doctors per capita: In medical care, almost every city increased the number of doctors per capita, with the average growing from 2.5 doctors per 1,000 residents to 2.8 between 2005 and 2008. But, the disparities among cities also grew. In 2008, cities at the bottom quintile had 2.0 doctors per 1,000 people, compared with 3.6 doctors for cities at the top quintile.

- Education: There is a serious deficit of teachers in the major cities of Punjab, especially in Lahore, Faisalabad and Multan where on-average one teacher is teaching over 40 students. If we compare this with international averages, on-average this student-teacher ratio is 23:1. Rawalpindi and Gujranwala are performing little better on this indicator.

ii) Resource Efficiency: The data confirms that much of Punjab's growth was driven by industries that are heavy users of resources, especially electricity. The greater consumption – up to a certain point – of electricity, water and industrial waste are considered as proxies for development and growth of cities, however, if the consumption exceeds the natural or production capacities of the cities, it starts to adversely affect sustainable development.

- Electricity: The province intends to become highly energy efficient and or less energy intensive, however rapid economic growth lead to an increased use of electricity. The status of Punjab’s cities on this indicator can’t be compared due to non-availability of data, and this can be considered as a limitation of the analysis of the Punjab Economic Report.

- Water consumption: The average consumption of water in major cities of Punjab is much higher than international averages. So far, 4 out of 5 major cities (except Faisalabad) of Punjab have improved access to water, however, if the consumption remains as high as 98,640 litres per capita per year in Punjab, compared to an international average of 47,000 litres per person, then this could lead to reduced access to water. Solution to this clearly lies with changing behaviours of the citizens – as more responsible citizens – towards the efficient and effective use of available water sources. In addition, city administrations should introduce water meters to monitor and control consumption of water.

- Industrial waste: Punjab has made significant progress in this area. 4 out of 5 cities in Punjab have moderately improved capacity to collect, recycle and use industrial waste.

iii) Environmental Cleanliness: Punjab is making some progress in environmental cleanliness, but overall progress remains far below world standards. Related factors influencing sustainable development include the management and control of air pollution, industrial SO2 discharge, wastewater treatment and proper collection and transportation of domestic waste.

- Industrial pollution: Though industrial emissions have been declining, Punjab’s cities remain well above the standards seen in urban areas in developed countries. Faisalabad is the worst in producing industrial waste i.e. SO2 discharge, mainly because of the existence of heavy industry in the area. To improve this, there is a need to introduce new technology and policy initiatives that can bring emissions considerably lower in cities of Punjab.

- Wastewater treatment: Out of 5 major cities of Punjab, 2 cities i.e. Lahore and Rawalpindi have the capacity to treat wastewater, whereas the remaining 3 cities clearly lack capacity in the area. The establishment of water treatment plants is required in these cities for making sustainable use of water resources.

- Waste Management: Domestic waste collection remained steady in Punjab’s cities, with the average annual pickup per person 87 kilograms. If compare among cities of Punjab, Lahore has a more effective collection and
disposal of domestic waste i.e. 215 kgs per person, while the performance of remaining 4 cities remained very low. Following the establishment of the waste management company in Lahore, Government of Punjab has initiated the establishment of waste management companies in all major cities of Punjab. It is expected that Punjab will improve on this indicator in the coming years.

iv) Environment: Urban densities in Punjab are or better than those seen in developing and developed countries, however, trends suggest that urban areas in Punjab will become even denser. High density, to a certain point, is the cornerstone of sustainable urban development as high density brings the efficient use of city resources. For example, it results in less energy use per capita, increased bus ridership, reduced waste production, etc.

• Urban Density: In Punjab, it is difficult to estimate urban density because of a large number of migrations every year, especially to these large cities. This can also be correlated with a sharp shift in Punjab’s economy from an agrarian economy to more of an industrial and service-oriented economy. The estimates of persons per square kilometre in Punjab indicates that there is still a lot of potential for improving urban density in all the 5 major cities of Punjab, especially in Rawalpindi, Gujranwala and Multan.

• Use of public transport: Ridership for public transportation in major cities of Punjab has grown in recent years, however, it is still far less than the levels seen in developed countries. As compared to an international average of 33, only 18 percent in Lahore, 16 percent in Rawalpindi and 13 percent in Multan travel by public transport service. This has a direct link with the availability of an efficient, economical and reliable public transport in the cities of Punjab. The recent development in Punjab on the establishment of “system of public transit” i.e. Metro bus service in 3 major cities including Lahore, Multan and Rawalpindi-Islamabad and an ongoing initiative of Orange line train service in Lahore has significant potential to improve the use of public transport in these cities.

7.5 Key Recommendations

Based upon an objective and systematic assessment of the urban and infrastructure development in Punjab, The Punjab Economic Report realizes that there is a further need to harness the potential of cities to grow and act as ‘engine of growth’ for the Punjab province and Pakistan. And this requires an informed policy by government, effective regulations and smarter investments on infrastructure and urban development. Punjab can benefit the maximum if it rightly prioritizes its infrastructure development needs for higher growth and development. It is yet difficult to accurately estimate and compare the social and economic benefits of various infrastructure development projects. However, the literature suggests some of the guiding principles of ‘which infrastructure matters and when?’. This also implies the importance of balanced and sustainable urban development that improves the lives of the people without exhausting the environment or other resources.

In Punjab, the last decade was more about urbanization and meeting the urgent infrastructure needs of the cities, mainly to accommodate the huge influx of immigrants. However, after the 18th Amendment in 2010, it is quite evident that Punjab considered a holistic approach toward urban sustainable development. Initiatives such as metro bus service, establishment of solid waste management companies, Punjab environmental protecting authorities, housing authorities, safe city project, intermediate city development programme, etc. are highly effective for not only bringing sustainability to existing development but also in creating opportunities for further growth and development in the cities.

Principles of Sustainable Cities

• Sustainability (Resilience): committing to environmental management;
• Accessibility: facilitating ease of movement;
• Diversity: maintaining variety and choice for all;
• Open Space: maintaining natural systems to make cities green;
• Compatibility: maintaining harmony and balance;
• Incentives: to renew and redevelop declining areas;
• Adaptability: able to accommodate change;
• Density: design compact cities with appropriate transit;
• Identity: create and preserve a unique sense of space.
The analysis of Punjab’s policies, initiatives and budgetary allocations confirm the already aligned focus of its infrastructure and urban development towards achieving sustainable economic growth, creating job opportunities, improving exports and making Punjab a more secure, economically vibrant and industrialized province, offering cities a prosperous and fulfilling life. Nevertheless, there are areas where Punjab needs to improve its focus to deepen the impact of its efforts on infrastructure and urban development. These include:

**Prudent investments for inclusive growth:** Likewise, other provincial governments, Punjab does not have sufficient endowment of resources to invest simultaneously in all sectors of the economy in order to achieve balanced growth. Therefore, investments in strategically selected industries or sectors of the economy are needed to lead to new investment opportunities and so to pave the way for further inclusive economic development. It is also well recognized that government alone cannot meet all the infrastructure development needs of the province, especially at this fast pace of urbanization. Leveraging the private sector investments in Punjab would require the government to i) improve investment policy, especially with no discrimination to foreign investment, ii) improve regulations and business enabling environment, and, iii) utilize public investments in areas which may or may not directly contribute to direct stock of physical infrastructure but leverage private sector investment for infrastructure and urban development in Punjab.

**Provincial and regional urban planning frameworks:** It is also important for Punjab to develop its strategic frameworks for urban planning at provincial, regional and city level. These frameworks should be in line with Punjab’s Economic Growth Strategy, SDGs and indicators for sustainable cities. The frameworks will organize and inform the efforts of urban development in Punjab, whereby elements of social development will be incorporated. The framework should inculcate elements of sustainability, accessibility, diversity, open space, compatibility, incentives, adaptability, density and identity in the overall urban planning.

**Infrastructure-assets management:** Maintaining infrastructure is not a new problem, but this is something that is left aside by the governments – maybe because it does add to the existing stock of physical infrastructure. The management and off-course increasing cost of management and infrastructure are huge challenges as well – as infrastructure itself is evolving. For hundreds of years, engineers have had to design systems for providing clean water and disposing of sewage. In recent centuries, systems for transmitting information and providing energy have expanded and complicated the infrastructure network, beginning with telegraph and telephone lines and now encompassing all sorts of telecommunications systems. Cable TV, cell phones, and internet access all depend on elaborate infrastructure installations. Development of remote wind and solar energy resources will add more. Much of the existing infrastructure is buried, posing several problems for maintenance and upgrading it. For one thing, in many cases, records of the locations of all the underground pipes and cables are unavailable or incomplete. One major challenge will be to devise methods for mapping and labelling buried infrastructure, both to assist in improving it and to help avoid damaging it. Knowing this, Punjab has initiated a project in the major cities of the province to develop integrated infrastructure plans for the cities, by mapping existing infrastructure, especially underground, for effective management and maintenance. It is also important for Punjab to scientifically calculate the value of its physical assets/ infrastructure and start allocating a certain portion of funds, in each years’ budget, for maintenance of this infrastructure. Given the magnitude of the maintenance backlog in many sectors, it is difficult to know where to start. It is important for Punjab to have its “Provincial Infrastructure Maintenance Strategy (PIMS)” and also “Infrastructure Maintenance Budgeting Guideline”. These two should guide the government’s actions on the maintenance of the existing infrastructure in Punjab.

**Sustainable infrastructure that is high performing, cost-effective, resource-efficient and environmentally-friendly:** It is important for Punjab to make more prudent investments in infrastructure, abiding by principles of economy, efficiency, effectiveness, impact and sustainability. The pre-feasibilities for mega infrastructure projects need to be carried out carefully, with more precise estimates on social and economic returns. In addition, international best practices and infrastructure designs and models need to be consulted while designing the architect of such projects. It is also important that regular monitoring and evaluation of these major development projects should be done to assess the impact and sustainability of these initiatives and to document learning from these for future programming. With an ever-increasing public investment in infrastructure and urban development, it is critical for Punjab to have its “Guidelines for impact evaluation of large infrastructure projects”.

**Integrated approach to infrastructure development:** The governance, management, budgeting and monitoring of infrastructure and urban development in major cities of Punjab have become huge challenges. This is mainly due to the fact that over 15 different public-sector departments/ entities, operating independently, are looking after the affairs of these cities. And more worrisome is their lack of coordination. This causes inefficiencies – duplication or waste of public investment, inconsistency in the overall approach to urban development and lack of synergies and accountability. There
is a greater need to develop and adopt integrated city development strategies, which takes a strategic approach to policy development and implementation incorporating the needs and aspirations of a full cross-section of stakeholders to achieve the city's own future vision. The government of the Punjab, through Urban Unit, has started developing integrated city development strategies for major and intermediate cities of Punjab. This ownership and engagement of all public and private sector stakeholders on these strategies need to be ensured to maximize the benefits of this work.

**Rebalance towards society and the environment:** The improvements in social and environmental development lead to an inclusive and sustainable development of cities. It is important that as cities grow, a direct and positive correlation of economic performance establishes with social performance and with environmental cleanliness. This assessment of 5 major cities of Punjab on ‘indicators for sustainable cities’ confirms that when a city’s economy, like Lahore, reaches a certain level of maturity, imbalance emerges between the economy and the social and environmental aspects. Rich and large cities are developing at the cost of social and environmental deterioration. The key growth strategy for these cities would be to promote productivity – to make the best use of the resources in place instead of hoping that continuous growth in inputs will deliver better results. Population and economic size expansion by themselves cannot deliver a better quality of life as they lack advanced city management capabilities. Productivity growth, on the other hand, enhances efficiency to enable cities to economically develop while delivering social and environmental benefits. Punjab’s intention behind the initiative of ‘integrated city development’ and ‘development of intermediate cities’ – as an approach – are the most promising initiatives in the direction of achieving, from the very start, sustainable development of cities, wherein not only economic performance is achieved but citizens experience of life on social and environmental aspects also improved.

**Understanding urban immigration dynamics:** In Punjab, there is a huge population pressure, especially of the youth entering job market. The youth population contributes more in the proportion of population moving to urban cities; and they are struggling with how to improve the quality of its employment. Despite Punjab’s efforts to improve productive engagement of youth (initiative like PSDF, Youth loan scheme, etc.) the economy is still struggling to adequately benefit from the available labour force. This is mainly because; firstly, the labour market is still a buyer’s market, with no effective measures taken to adjust it; secondly, the increase in low-quality labour remains unchanged, and thirdly, the labour market has been unable to reverse a vicious circle of continuously using low-quality labour force with low compensation and forming low-end employment patterns. The Punjab Economic Growth Strategy 2014-18 suggested an employment-intensive economic growth that will focus on employment generation by the revival of employment-intensive sectors and creation of quality jobs. The Strategy focused on addressing critical gaps in human capital to benefit from the growing economy. However, it remained unable to suggest appropriate measures to improve the overall structure and performance of the labour markets to effectively employ labour. Punjab needs to understand and analyse the findings of the labour market surveys and formulate a comprehensive strategy which guides the labour market on how best they can benefit from available labour forces in Punjab. The recent initiative in Punjab, supported by Asian Development Bank, on ‘Inclusive businesses’ is an important step, if implemented properly, towards engagement of active, but unutilized, human resource in the job market for sustainable economic growth.
Orange line train service in Lahore has significant potential to improve the use of public transport in these cities of Punjab. The recent development in Punjab on the establishment of "system of public transit" i.e. Metro service. This has a direct link with the availability of an efficient, economical and reliable public transport in the cities of Punjab, especially in Rawalpindi, Gujranwala and Multan. However, it is still far less than the levels seen in developed countries. As compared to an international average of 33, only 18 percent in Lahore, 16 percent in Rawalpindi and 13 percent in Multan travel by public transport.

Use of public transport:

Ridership for public transportation in major cities of Punjab has grown in recent years, however, trends suggest that urban areas in Punjab will become even denser. High density, to a certain point, is the cornerstone of sustainable urban development as high density brings the efficient use of city resources. For example, it results in less energy use per capita, increased bus ridership, reduced waste production, etc.

Environment:

Punjab has made significant progress in this area. 4 out of 5 cities in Punjab have moderately improved capacity to collect, recycle and use industrial waste. However, trends remain far below world standards. Related factors influencing sustainable development include the management of domestic waste, wastewater treatment and proper collection and transportation of domestic waste.

Domestic waste collection remained steady in Punjab's cities, with the average annual pickup per person 87 kilograms. If compared among cities of Punjab, Lahore has a more effective collection and disposal of domestic waste i.e. 215 kgs per person, while the performance of remaining 4 cities remained very low.

Wastewater treatment: Out of 5 major cities of Punjab, 2 cities i.e. Lahore and Rawalpindi have the capacity to treat wastewater, whereas the remaining 3 cities clearly lack capacity in this area. The establishment of water management companies in all major cities of Punjab is expected. It is expected that Punjab will further expand this initiative.

Industrial waste: Punjab has made significant progress in this area. 4 out of 5 cities in Punjab have moderately improved capacity to collect, recycle and use industrial waste. However, related factors influencing sustainable development include the management of industrial waste, wastewater treatment and proper collection and transportation of domestic waste.

Basic Needs:

Under effective city management, fulfilling the basic needs of residents is a relatively straightforward task as a city's economy grows. If additional resources can be mobilized, utility infrastructure can be upgraded to accommodate the growing population. Under effective city management, fulfilling the basic needs of residents is a relatively straightforward task as a city's economy grows. If additional resources can be mobilized, utility infrastructure can be upgraded to accommodate the growing population.

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