Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 14 Issue 05, May-2025

Lahore at the Crossroads: Urban Planning Challenges and Pathways to Sustainable Growth (1990–2024)

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***Abstract*— Lahore, the vibrant cultural capital of Pakistan and its second-largest metropolis, stands at a pivotal crossroads in its urban evolution. From its origins as a fortified Mughal city to a colonial administrative hub, and now a sprawling megacity of over 14 million, Lahore's transformation reflects both progress and peril. Between 1990 and 2024, explosive population growth, rapid land conversion, and infrastructural stress have outpaced institutional capacity, exposing deep-rooted urban planning deficiencies. This review paper comprehensively examines Lahore's urban planning trajectory, analyzing demographic shifts, environmental degradation, housing shortages, and governance fragmentation. It critiques the limited effectiveness of planning frameworks such as the Master Plan 2021 and proposed Master Plan 2050, highlighting enforcement gaps, legal ambiguity, and socio-spatial inequities. Simultaneously, it evaluates policy responses including mass transit investments, waste management initiatives, and digital land reforms. Drawing from interdisciplinary data and global South urbanism discourse, the study reveals a stark need for transformative governance, integrated land use, and climate-resilient planning. The paper concludes by proposing a forward-looking vision grounded in equity, sustainability, and smart urban innovation that can steer Lahore toward a livable, inclusive, and globally competitive future**

***Keywords*—Rapid Urbanization; Lahore Infrastructure Deficits; Urban Planning Crisis; Spatial Governance; Policy Reform**

I. INTRODUCTION

Lahore, which is often described as the 'cultural heart of Pakistan', has an urban history that goes back over two millennia. Originally a fortified Mughal capital, the city has long served as an architectural, political, and cultural center of South Asia, continuing through British colonial rule. From its historic walled city, Lahore has grown into a sprawling metropolis, expanding rapidly into peri-urban and rural areas, especially to the south and southeast beyond its traditional boundaries. Today, it is the second-largest city in Pakistan and the capital of Punjab province, serving as a hub for education, commerce, technology, and governance [1].

Urban expansion in Lahore has been equally an opportunity and a challenge in terms of the economy. In 2008, the city's GDP (PPP) was estimated at USD 40 billion, with an annual growth rate projected at 5.6% for the period 2008–2025 [2]. However, the city's infrastructure, transportation systems, natural environment, and housing sector are under increasing pressure from this growth. Yet, rapid urbanisation is again fueled by investment and migration towards Lahore, which situates it strategically next to the India-Pakistan border and its industrial estates and knowledge economy.

In 2025, Pakistan's population was estimated to be 241 million individuals, or the 5th globally [3]. Punjab alone houses over 52% of the total population, with Lahore as its most urbanized and economically productive district [4]. Lahore's population grew almost four times over the period 1990–2025, with natural population growth, rural-to-urban migration, and regional conflict displacements [5].

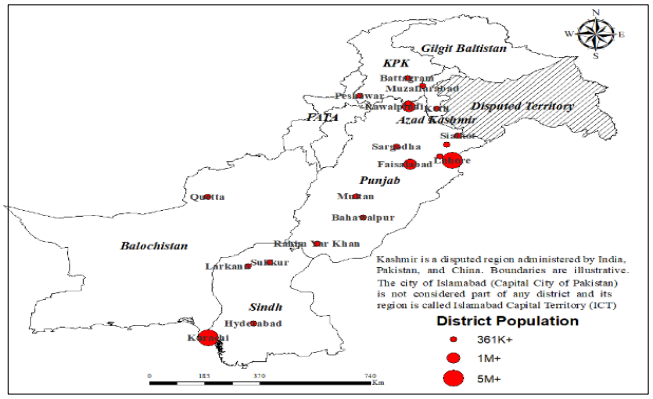

Fig.1.Population distribution district level in major cities of Pakistan.DataSoursehttps://worldpopulationreview.com/countries/pakistan

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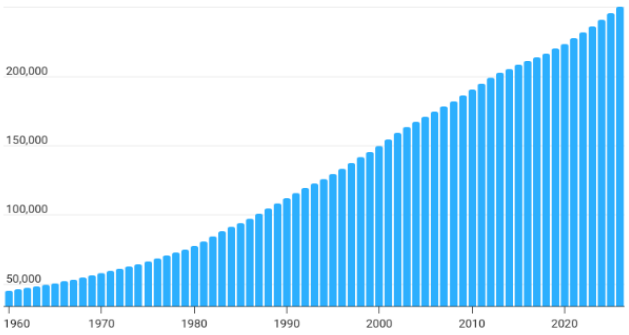
International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 14 Issue 05, May-2025

Despite this growth, urban governance in Lahore has struggled to keep pace. Among others, the fragmented institutions, poor enforcement of planning regulations, outdated legality, and low-level public participation have also led to unregulated urban sprawl, environmental degradation, and social injustice [6], [7]. Even though a few master plans, for instance Master Plan 2021 and the proposed plan of Master Plan 2050, have been made but they are hardly implemented, especially in peripheral zones that are fast urbanizing and badly affected by informal housing and planning speculation [8], [9].

Fig. 2. Pakistan Population 1960-2025. Source: [53]



This review critically assesses Lahore's urban planning challenges and policy responses from 1990 to 2024. Drawing on the latest demographic, spatial, and institutional data, it evaluates both achievements and shortcomings in urban governance. By analyzing peer-reviewed literature, government reports, and real-time spatial development trends, the paper offers actionable recommendations for inclusive, climate-resilient, and forward-looking urban development in one of South Asia's fastest-growing cities.

II. BASIC INFORMATION ABOUT LAHORE

Lahore is Pakistan's second-largest city and the capital of Punjab province, located near the eastern border with India. It spans approximately 1,792 km², with an elevation of around 217 meters above sea level and a predominantly flat terrain. Administratively, Lahore is divided into ten tehsils, includings Lahore City, Model Town, Raiwind, Shalimar, and Cantonment, with over 150 Union Councils, the majority of which are urban [4]

Lahore experiences extreme climate variations. The summer season occurs from April to September, with temperatures averaging from 40°C to 48°C and peak heat around May and June. The city experiences its coldest period from November to February, when temperatures drop to near-freezing levels of 0°C. The city receives the bulk of its annual rainfall during the monsoon season in July and August, while the remainder of the year remains largely dry.

The city has a dense road network exceeding 1,260 kilometres, and the Excise and Taxation Department reports over 4 million registered vehicles. Lahore has a public transport consisting of Metrobus, Orange line Metro Train, and a variety of private transport such as rickshaws, taxis, vans, and ride-hailing services. The Allamah Iqbal International Airport in Lahore is connected with domestic and international destinations, and Lahore Junction Railway Station is a major rail junction for the area.

Lahore currently hosts approximately 657 primary schools, 219 middle schools, and 327 government high schools, along with 47 government colleges and several prestigious universities such as Punjab University, the University of Engineering and Technology (UET), and Lahore University of Management Sciences (LUMS). However, both the education and healthcare sectors are under increasing strain due to Lahore's rapidly growing population. There are only 54 public hospitals, many of which lack adequate facilities an

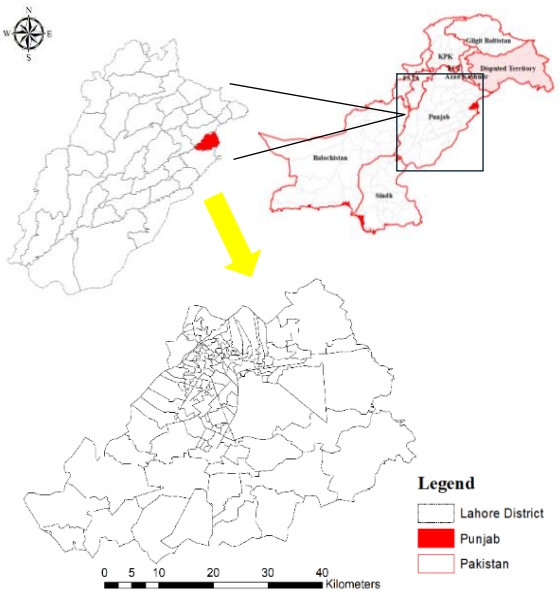


Fig. 3. Location of Study Area

The population of Lahore has grown nearly fourfold over the past 35 years. From under 4 million in 1990, the city's population surged to over 14.8 million by 2025, with a peak annual growth rate of 4.23% during the 2000s and a current average exceeding 3% per year [10]

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ISSN: 2278-0181
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TABLE. I. Socioeconomic and infrastructure development situation in Lahore. Data Source: [4]

Indicator	Value / Status
Adult Literacy Rate (Age 15+)	84.2%
Use of Improved Drinking Water Sources	98.3%
Use of Improved Sanitation Facilities	80.1%
Use of Basic Sanitation Services (Not Shared)	70.4%
Handwashing Facility with Water & Soap (on premises)	92.1%
Primary School Net Attendance Ratio (Punjab)	65.4% (total); 71.4% (urban)
Electricity Access (Urban Punjab)	99.5%
Employment Rate (Approx.)	97.3%
Average Household Size (Lahore District)	3.66 persons/household
Households Using Gas for Cooking (Punjab urban proxy)	85.3%
Percentage of House Ownership (Urban Lahore proxy)	~84.2%

III. HISTORICAL OVERVIEW OF LAHORE'S URBANIZATION

During the past century, the Pakistani provincial capital and second-biggest urban centre, Lahore, experienced significant metropolitan development. The metamorphosis of the historic walled city into a modern urban metropolis exists because of multiple interconnected socio-economic, political, and environmental factors.

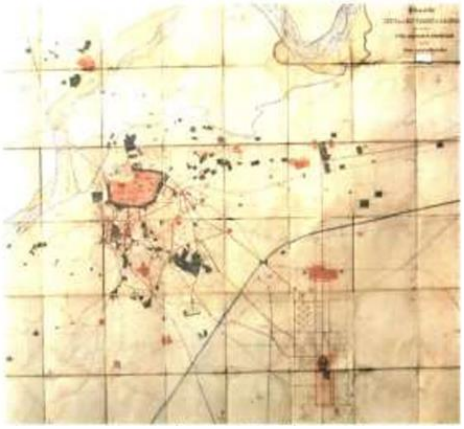
A. Colonial and Pre-Independence Urban Form

During Mughal times, Lahore emerged as a densely packed, prosperous city because of its magnificent architecture and thoughtfully designed gardens situated at a strategically important position. The Walled City of Lahore established itself as the central urban center while it protected commercial administrative services and residential areas inside fortified walls.

Fig. 4. 1846 Map of Lahore Shows British Cantonment Stationed at Anarkali Sourec: [54]

British colonial administration led to spatial modifications of the city between the middle of the 19th century and the middle of the 20th century. The British planners applied the "garden city" concept, integrating segregated residential clusters with straightened infrastructure elements and open spaces[11].

Fig. 5. 1867 map of Lahore showing the city's historical layout, including the walled city, Mian Mir Cantonment, and major developments such as the railway network and Mall Road. The map depicts Lahore before significant modern transformations. Source: [54]



This new development focused on Western inspirations, which combined order with control and hygiene principles while expressing these principles in the Lahore Cantonment [12].

Fig. 6. Lahore's Civil Station, circa 1900. Sourec: [54]

The Lahore Improvement Trust (LIT) brought formal planning institutions to the city through its establishment in 1936 to address regulatory problems and create affordable housing projects.

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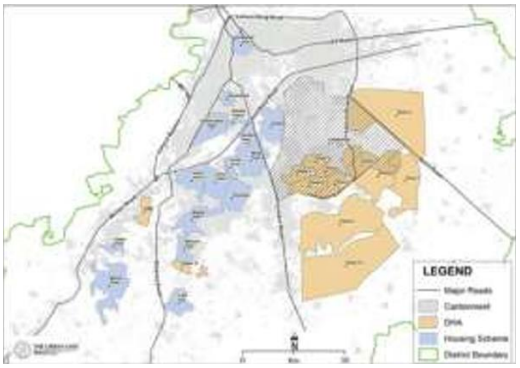
B. Post-Independence Growth (1947–2000)

Independence in 1947 led to an enormous population increase in Lahore because many people migrated there as refugees from India. The city's housing stock and urban services faced extreme pressure because of the population demographics shifting in this period. Lahore continued without a unified master planning system from its municipal government inception until the implementation of planning standards in the 1960s. The urban expansion of Lahore during this time ntial and substandard community services. A 1998 census showed that 16.4% of the Lahore population consisted of migratory individuals who selected underdeveloped residential areas for residence[13].

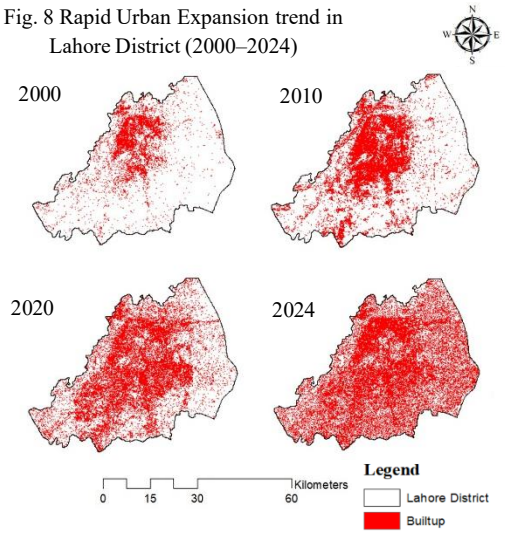
Fig.7. Prominent Housing Schemes of Lahore. Source: [54]



C. Rapid Urban Expansion (2000–2024)

The urban territory of Lahore grew rapidly between 2000 and 2024 following real estate freedom, changes in infrastructure investments, and neoliberal policy reforms. The built-up area of Lahore grew noticeably from 15,541 hectares (27%) in 1990 to 23,024 hectares (40%) in 2020 due to the extensive transformation of plant-filled land and farming fields into urban development[14]. Analysis of satellite images reveals the growth of bare land at the same rate as the reduction of water bodies and green areas, demonstrating irresponsible urban development[15]. Real estate development in DHA Johar Town and Bahria Town drove the city's linear expansion along transportation routes and ring roads, which resulted in significant environmental and climate problems. Between 1996 and 2016, the land surface temperature in areas without vegetation increased by 6°C in Lahore[16]. Recent smog events are directly connected to the decrease in green vegetation areas and the expansion of concrete surfaces across the city. The rise of gated communities alongside speculative real estate markets has activated more social disparities and land transaction systems, which deepened.

Fig. 8 Rapid Urban Expansion trend in Lahore District (2000–2024)



The progressive establishment of the Lahore Knowledge Park and the recent launch of Central Business District projects reflect efforts to transition toward knowledge-based and high-value commercial urban planning frameworks. Additionally, implementing the Ravi Urban Development Authority (RUDA) Master Plan marks a significant shift towards large-scale riverfront urban regeneration with climate-resilient strategies. The analysis covers three periods, beginning with colonial administration, continuing through post-independence governance, and ending with neoliberal economic frameworks, which demonstrate the combination effect of demographic patterns, governmental systems, economic needs, and environmental preservation. Understanding this historical pattern is crucial for modern urban problem assessment and strategic development planning for sustainable urban expansion.

IV. DEMOGRAPHIC GROWTH AND TRENDS

From 1999 to 2024, Lahore experienced significant population changes, transforming its urban environment. Over the period from 1998 to 2024, the city witnessed rapid population expansion, which increased from 6.3 million residents to more than 11 million residents, and the projection indicates 13 million residents by 2024 [17]. The population growth of Lahore stems from natural reproduction and significant rural migration toward urban centers because of its position as an economic, educational, and infrastructure development center. The 2017 census statistics showed that seventy-five percent of the population in the Lahore District settled in urban areas, indicating an ongoing urban trend that reduced rural population numbers. Urban areas of the district contained 8.5 million residents, compared to 2.6 million in rural areas in numbers, demonstrating swift metropolitan growth.

The substantial population growth has generated a rapid rise in population density. The population density in 1998 was 12,848 persons per square kilometre, while it reached almost 19,000 people per square kilometre by 2017. The southern

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International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
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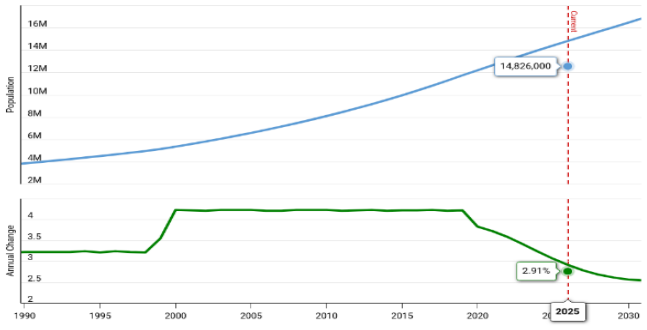
and central parts of Lahore now face severe congestion due to the increasing number of high-rise residential and commercial districts and illegal housing settlements. Urban space needs skyrocketed, and agricultural lands and vacant open fields progressively turned into developed areas. Judging from modern spatial investigations, Lahore experienced a 27% built-up area in 1990, which surged to 40% in 2020 and could potentially exceed 75.8% by 2048 based on projected growth patterns [18], [19].

TABLE. II Historical Population and Growth Rate Data of Lahore. Data Source: [10]

Year	Population	Growth Rate
1990	3,970,000	3.22%
2000	5,576,000	4.22%
2010	8,432,000	4.21%
2020	12,642,000	3.72%
2024	14,407,000	3.06%
2025	14,826,000	2.91%

Population growth has produced substantial adverse impacts on the environment. Rapid urban growth has depleted vegetation cover to a level of 34% from its original value of 59% in 1990, along with water body reductions from 4% to 2% during the 1990 to 2020 period [14]. The conversion of land for different uses has resulted in urban heat islands alongside dangerous increases in land surface temperatures (LST). The mean land surface temperature (LST) in Lahore, derived from satellite-based thermal imagery, elevated from 14–28°C in 1990 to 34–36°C in 2018 while showing a strong connection to the reduction of vegetation and the growth of urbanized surfaces[18], [19]. Quantitative research indicates that the local temperatures increased by about 6°C as green space decreased by 9% from 1996 to 2016.

Fig. 9. Population and Annual Change Chart from 1990-20230 and Current Status Source: [10]



Pollution-caused air contamination and regular smog episodes have worsened the environmental issues, requiring immediate attention through comprehensive urban planning. Recent urban management discussions emphasize the need for integrated blue-green infrastructure planning to mitigate urban heat and environmental degradation. Lahore demands sustainable urban management strategies to address its growing housing needs, infrastructure requirements, and environmental resilience challenges based on these demographic trends from 1999 to 2024.

V. ECONOMIC IMPORTANCE AND REGIONAL ROLE

Pakistan's economy and regional development rely on Lahore as an essential driver of urban expansion throughout the nation. The status of Punjab's capital allows Lahore to make substantial contributions to Pakistan's GDP growth and workforce employment. The city establishes itself as a centre for business dealings and manufacturing, along with service provision, education, and cultural activities, which draws investments and a workforce from all parts of Pakistan. Lahore has demonstrated that it plays a significant role in Punjab's industry and business, with prominent positions in the textile sector manufacturing alongside pharmaceutical production, food processing, and construction material manufacturing[20]. The city's economic strength was established by combining Sundar Industrial Estate and Quaid-e-Azam Industrial Estate with the central business areas of Gulberg and Ferozepur Road. These zones drive spatial growth and Labor market expansion through targeted infrastructure development, which centres on economic corridors.

The city has become a critical logistics and transport centre because of the Lahore Ring Road, together with the Metrobus service and the Orange Line Metro Train that boost internal movements and the motorways (M2, M11) along with Wagah Border access, strengthen its regional and cross-border connections[21]. The created opportunities have established new development spaces extending across the metropolitan area's southern and eastern territories. The development of the Ravi Urban Development Project further highlights Lahore's role in pioneering large-scale urban innovation in Pakistan.

The city of Lahore hosts educational institutions at the highest level, which include the University of the Punjab and LUMS alongside UET and NUST-Lahore campus, thus drawing local highly-skilled professionals for knowledge-based development. Hybridized with speculative market investments and middle-class residential needs, the real estate industry adds economic momentum to Lahore, although causing spatial imbalance and unsound land practices [22].

Lahore extends profound regional power toward the Sheikhupura District, Gujranwala District, and Kasur District, as these areas have merged their functions with the city. Regional economic activity through the Lahore Division is a local economic centre that advances peri-urban growth

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through strengthened boundaries between economic zones, Labor forces, and infrastructure connectivity [13].

Lahore is experiencing urban expansion because of its changing business purpose and strategic location in the region, which are becoming a starting point for economic prospects with simultaneous urban development difficulties.

VI. ADMINISTRATIVE STRUCTURE AND METROPOLITAN PLANNING AUTHORITIES

Urban development governance in Lahore functions through a complicated system that includes various provincial and local administrative bodies. The decentralized institutional structure, including multiple overlapping authorities, creates obstacles to effective urban planning coordination and sustainable development [13].

The Government of Punjab leads urban development through policy-making, infrastructure investment, and land use regulatory efforts at the most senior level. Several provincial departments, such as the Punjab Housing and Urban Development Department, the Punjab Local Government & Community Development Department, and the Punjab Planning & Development Board, have overlapping land management and urban planning authority.

The central planning authority in the Lahore Development Authority (LDA) controls land use regulations and housing scheme approvals while preparing master plans for the city. The legal authority under the LDA Act of 1975 allows the authority to develop plans that extend beyond Lahore city boundaries into all areas of the Lahore Division. The LDA presents its Integrated Master Plan for Lahore 2021 (MPL 2021) and releases the proposal for the Lahore Master Plan 2050 to provide direction for the city's spatial development. These plans receive widespread criticism as top-down approaches developed by developers lack proper enforcement, especially in peri-urban areas [21].

In addition to the LDA, several specialized agencies operate within Lahore's urban governance landscape, including:

- Water and Sanitation Agency (WASA) – manages water supply and sewage
- Traffic Engineering and Planning Agency (TEPA) – responsible for traffic management and transport infrastructure
- Parks and Horticulture Authority (PHA) – manages green space and urban aesthetics

Furthermore, the Metropolitan Corporation Lahore (MCL), under the local government system, has limited capacity and resources to execute municipal functions effectively. Due to shifting political priorities and reforms in local governance laws, frequent changes in administrative structures have undermined long-term urban development efforts [22].

An important limitation is the lack of inter-agency coordination, which has led to inconsistent implementation of master plans, the proliferation of unregulated housing societies, and poor service delivery in expanding urban and peri-urban areas. This has been further exacerbated by weak enforcement of zoning regulations and the absence of reliable digital cadastral systems [13].

Despite these institutional challenges, a growing call is for adopting participatory governance models and integrated spatial data systems to enable transparent, citizen-centered planning practices. While Lahore has a formal institutional framework for planning, the fragmentation of authority, coupled with bureaucratic inefficiencies, lack of transparency, and inadequate public participation, continues to hinder the realization of integrated and sustainable urban growth [23].

VII. URBAN PLANNING CHALLENGES IN LAHORE

The fast urban expansion of Lahore in recent times has failed to generate sufficient institutional development for planning and infrastructural services, along with land utilization regulation. Various interconnected urban planning problems erode structural, spatial equality, environmental sustainability, and future urban liveability in the city. Urban growth at extreme rates and its massive scale creates planning challenges, operational failures within planning institutions, inconsistent policy execution, and fragmented governance systems [5], [24], [25].

A. Institutional Fragmentation and Poor Coordination

Multiple agencies maintain overlapping responsibilities while displaying minimal coordination within Lahore's urban governance structure. Various divisions of key responsibilities within urban development exist between the Lahore Development Authority (LDA) and Water and Sanitation Agency (WASA), as well as the Traffic Engineering and Planning Agency (TEPA) and Parks and Horticulture Authority (PHA), and additional governmental agencies [25]. The purposeful creation of these agencies led to independent operations that produced duplicated work with contradicting guidelines and service delivery shortfalls [13].

Lahore faces additional planning continuity problems because structural reforms and changing political focus make planning initiatives unstable. Citywide urban development programs experience challenges because the Metropolitan Corporation Lahore (MCL) faces financial and technical limitations regarding program implementation. The city faces severe limitations in developing and implementing strategic urban plans because it lacks a centralized authority with planning empowerment [22]. These structural gaps are further aggravated by outdated bureaucratic procedures and limited inter-agency coordination mechanisms, especially in peri-urban governance [8], [26]

B. Weak Legal Frameworks and Ineffective Master Planning

Several master plans, including the Lahore Master Plan 2021 and the proposed Lahore Master Plan 2050, exist, but they fail to improve spatial regulation in the city. These master plans retain an advisory designation because they lack enforceable legal authority, subjecting them to minimal mandatory control. Zoning violations, unauthorized land use conversions, and encroachments frequently occur in formal and informal sections of both sectors [22].

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The implementation gap emerges because of political interventions mixed with administrative disruptions. Changing planning priorities introduced by different governments to achieve short-term electoral success result in inconsistent long-term strategic implementation. Based on data research, the city develops sporadic and reactive planning methods over proactive urban management systems. LDA's weak enforcement capabilities and restricted oversight of some peri-urban districts limit its power to control new development projects [7]. Despite repeated efforts, the master planning process has failed to adapt to urban realities, lacking responsiveness and inclusivity in vision [8], [27].

C. Proliferation of Unregulated Housing Societies

The main effect of poor planning in Lahore took shape by creating numerous unauthorized or unusual housing communities that developed across the peripheral areas of the city. Such development schemes are initiated without proper environmental permissions, infrastructure preparations, and

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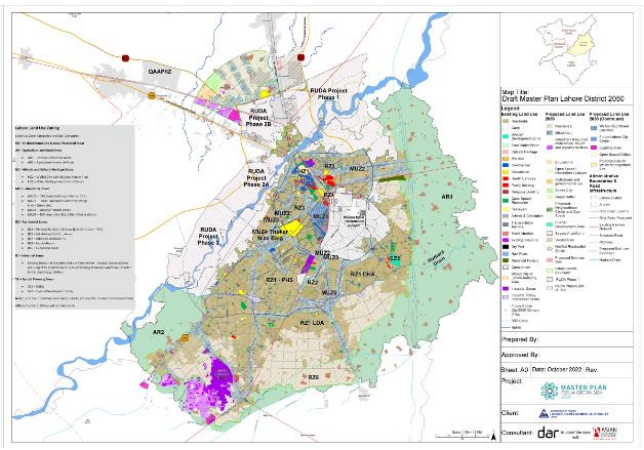
procedures while setting off unplanned development patterns [7].

Fig. 10. Draft Maps of Lahore District from LDA Master Plan 2050. Map Source: [55]



Social and ecological expenses increase directly due to this unattended development pattern. Most housing communities built without official regulation lack essential infrastructure like paved roadways, wastewater systems, safe drinking water, and waste disposal facilities. The increased disorder in these residential properties denies inhabitants access to urban services and prevents them from obtaining official property titles. Without an electronic land registration system, illegal land grabbing and record manipulation become possible, in addition to difficulties with monitoring land deals [22]. Many housing schemes developed on peri-urban farmland are contributing to the loss of agricultural land and fuelling climate risks [28]

D. Traffic Congestion and Inadequate Transportation Planning

The fast-growing population of Lahore, together with expanding city boundaries, motivated residents to buy more cars, which resulted in severe traffic jams throughout the metropolitan area. Daily traffic jams frequently occur throughout central areas, including Ferozepur Road, Canal Road, and Mall Road, because the city roads have failed to keep pace with development. The newly built Metrobus and Orange Line Metro Train systems have not addressed the population's travel needs because they operate in isolated routes without connecting to a unified public transport network [22]. Traffic congestion also reflects ineffective enforcement of traffic management strategies and insufficient transport demand forecasting [7], [29], [30].

Most modern urban developments in the city lack infrastructure that would support pedestrian movement and other non-motorized transport modes. Current transport policy focuses primarily on roads instead of transit-oriented development (TOD) and last-mile solutions, thus forcing excessive reliance on private cars and motorcycles, heightening traffic pollution, and reducing roadway safety.

E. Socio-Spatial Inequality and Informal Settlements

The urban development pattern in Lahore shows substantial geographical differences between planned gated communities and unplanned housing areas. Upmarket residents have chosen to settle in the enclosed residential communities of DHA and Bahria Town because these communities provide premium urban amenities and safety protocols. People with lower income levels must live in shoddy katchi abadis slums because government authorities place them in risky environmental areas with deficient infrastructure [22]. Studies on urban governance in Lahore have consistently shown that public participation in urban decision-making remains symbolic or tokenistic [31], [27].

Social inequalities between formal gated areas and informal settlements result in differences between physical and social service distribution and legal protection. Most informal settlements show no ownership rights while being ignored in urban planning activities and facing numerous eviction risks. Inadequate inclusion in planning practices by the state system leads to worsening social segregation of marginalized populations throughout cities.

F. Environmental Degradation and Climate Vulnerabilities

Environmental deterioration caused by uncontrolled Lahore growth created severe environmental conditions and health risks throughout the city. Lahore's vegetation declined substantially after builders rapidly turned agricultural land and green areas into urbanized land. From 1990 through 2020 [18] ,state that vegetation decreased from 59% to 34% while water bodies diminished from 4% to 2% (p.146). Research shows that the urban sprawl of Lahore correlates directly with the decline in groundwater recharge and increased surface temperatures [19], [24], [32]

The changes to the urban landscape have created heat islands that raised mean surface temperatures from below 14–28°C

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in 1990 to temperatures above 34–36°C in 2018 [19]. The shrinking vegetation and elevated emissions from vehicles and industries have generated unfavourable air conditions throughout the city that trigger seasonal smog occurrences and threaten human respiratory health. The combination of deficient drainage systems with unauthorized modifications of natural water routes makes the city more prone to flooding, especially during rainy seasons [18].

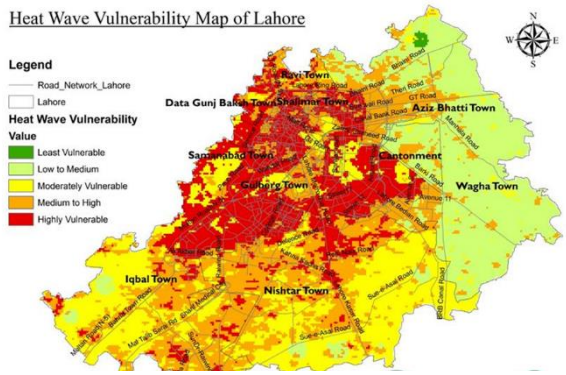

Fig. 11. Heat Wave Vulnerability Map of Lahore District From 2022-2025.Map Source: [56]

Environmental issues have minimal weight in current urban planning policies, even when the area faces urgent environmental problems. EIAs occur infrequently in significant infrastructure developments because the enforcement of environmental laws remains weak due to understaffing and institutional limitations [22].

G. Lack of Public Participation and Transparency

Decision-making processes in Lahore face constant difficulties since the public lacks meaningful opportunities to be involved. Most urban policies receive their concepts from technocratic decision-makers who proceed without citizen or community stakeholder consultation [22]. The inadequate citizen involvement in planning decisions eliminates public trust in authorities and reduces their power to hold officials responsible for their choices. Studies on urban governance in Lahore have consistently shown that public participation in urban decision-making remains symbolic or tokenistic [8], [31]

The public lacks access to planning data, land use maps, and project progress reports, creating a space for corruption to flourish while reducing transparency. The urban development agendas of cities remain inaccessible to vulnerable citizens who do not possess proper channels to either complain about problems or shape how development will unfold.

The urban planning problems facing Lahore operate at multiple levels of systemic dysfunction due to traditional planning frameworks, institutional disunity, weak governance, and unsustainable development methodologies. The solution demands substantial changes in legal reforms, the establishment of participatory approaches and environmental protection, and institutional improvements within urban planning. Lahore faces unmanaged challenges that will keep deteriorating its urban crises, making it difficult for the city to support its expanding population [33]. The consequences of decades of unregulated growth are starkly evident in how Lahore transformed from a colonial center into a fragmented megacity [34].

VIII. PLANNING STRATEGIES AND POLICY RESPONSES

The rapid urbanization of Pakistan's populous city of Lahore presents serious urban planning and development issues from 1990 to 2024. Several strategic planning initiatives and policy measures have been enacted to handle challenges concerning infrastructure development and environmental sustainability, alongside transportation problems and governance needs. This section analyzes the strategic initiatives through a compilation of 20 different scholarly articles and reports to avoid duplicate references to previously cited sources.

A. Institutional Reforms and Governance

Specialized authorities constitute a fundamental component within Lahore's urban governance transformations. The Lahore Ring Road Authority became operational in 2011 to monitor construction and operation activities while conducting maintenance procedures for the Lahore Ring Road to boost intra-city connectivity and decrease traffic congestion [35]. The Lahore Waste Management Company (LWMC) was established in 2010 to create a centralized and efficient integrated solid waste management system [36].

The purpose of the Punjab Land Records Authority (PLRA), which started in 2002 and grew following 2010, was to fight corruption while improving estate transactions through digital records adoption. The reforms implemented in recent years supported urban transparency but still face gaps in actual implementation [6].

B. Environmental Management Initiatives

Eliminating environmental destruction is an essential factor in Lahore's urban development plans. Under the Punjab Environmental Protection Act of 1997, the government created environmental governance frameworks, establishing the Lahore Clean Air Commission as a pollution control initiative in 2007 [37]. The 2020 Ravi Riverfront Urban Development Project works to restore the Ravi River by developing a sustainability-focused urban district near its riverbanks [38], [39]

Under the “Urban Greening Program” (2018–2023), the Punjab Forest Department and Parks and Horticulture Authority (PHA) started urban forestry initiatives to plant native trees to reduce urban heat islands. The implementation of these projects suffers due to insufficient long-term monitoring systems.

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C. Land Use and Commercialization Policies

Residential commercialization trends urgently need political measures to integrate development goals with local community needs. The Lahore Development Authority (LDA) Master Plan 2050 guides the city's expansion and land use, emphasizing the protection of agricultural land and the development of green zones [9]. The prolonged processing of the plan has created doubts regarding the lack of urban sprawl management [40].

Spatial analysis demonstrated how uncontrolled land conversions present dangers near transportation routes and peri-urban areas [41]. The weak enforcement of zoning is a persistent problem because political priorities and speculative real estate activities override its purpose [42].

D. Addressing Air Pollution and Environmental Health.

Air pollution in Lahore has developed into a vital environmental and public health concern, which intensifies annually. Lahore reached hazardous AQI levels exceeding 600 in late 2024, ranking it among the most polluted cities globally [43] [44]. The extreme fog caused Punjab to create its "smog war room" control center, which eventually forced both educational facilities to shut down their primary schools and ordered construction site restrictions [45].

Air pollution in Lahore exists mainly because of vehicular exhaust, industrial waste release, construction-generated dust, and agricultural burning practices. The government continues to make efforts to establish mitigation strategies, yet obstacles remain. Public criticism was raised about the Punjab government's ban on selected vehicles and building operations because of implementation obstacles and minimal sustainable benefits.

Environmental experts insist on adopting a complete solution to manage pollution in Lahore's air quality [45]. Public transportation needs improvement to decrease car use, and industrial plants must obey stricter emission guidelines. At the same time, ecosystem preservation and cross-border pollution source coordination should help address the challenge [46]. Pollution reduction needs community involvement, which requires public awareness campaigns as an essential component.

E. Major Urban Development Projects

The present-day urban transformation of Lahore involves multiple enormous construction initiatives. After construction, the Ravi Riverfront Urban Development Project aims to become the most extensive riverfront development worldwide. It offers space for 15 million people and features urban forestry and water filtration components [38]. The Lahore Development Plan began operations in 2024, using Rs74 billion from Phase I funding to advance improvements within six primary zones through modern infrastructure development

In 2021, the CBD Punjab started operations as an initiative to develop high-density mixed-use developments in Gulberg to slow urban growth processes along its horizontal dimension. The works and others warn that expansive development projects tend to miss opportunities for inclusive and just social development [48].

F. Community Participation and Public Engagement

Recent initiatives demonstrate the importance of involving the public when planning urban developments, so recent efforts seek to let citizens contribute their feedback to development plans. The prolonged time required to finalize Master Plan 2050 was caused by extensive stakeholder engagement efforts to involve citizens, town planners, and government departments in creating a shared vision for Lahore's future development [40], [47].

Through its initiative within the Punjab Cities Program, the Urban Unit launched planning experiments in union councils, demonstrating promising results for approaching infrastructure design through community involvement. Insufficient institutional strength and political instability tend to block the expansion of such initiatives.

The urban planning of Lahore from 1990 until 2024 involved implementing institutional changes alongside environmental initiatives, land use regulations, significant construction works, transportation system improvements, and collaboration strategies with community members. The implemented measures have tackled multiple urban problems, but ongoing problems like environmental sustainability, equitable development, and effective governance need ongoing attention and adaptive policy responses.

G. Transportation Infrastructure Enhancements

The city of Lahore spent funds to develop multiple transportation initiatives that fight congestion while enhancing public transportation. The 2013 inauguration of the Lahore Metrobus brought a bus rapid transit system that covers 27.8 km in length with 27 stations. Since 2020, the automated rapid transit system of Lahore Metro's Orange Line has begun operations for efficient urban mobility [49], [50], [51]. Transportation infrastructure improvements in the city will continue through the 2023 resumption of land acquisition for constructing the Gulberg-Babu Sabu elevated expressway [52].

Fig. 12. Map of Lahore with proposed Mass Transit lines. Map Source: [57]

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The Integrated Transport Planning Unit (ITPU), set up in 2015, functions to unite traffic planning among different agencies and present arguments against the inadequate treatment of multimodal integration and last-mile connectivity.

IX. DISCUSSION

Over thirty years, Lahore's urban growth mirrors South Asian metropolises' issues, coordinating business development with sustainable practices and democratic administration. Despite significant urban growth and infrastructure development in Lahore, the organization, environmental protection, and support for all city residents remain behind the times.

Our key learning shows that the rapid urban growth exceeds the planning systems' ability to adapt. The Master Plan for 2021 and 2050 introduced by Lahore faces limited effectiveness because officials cannot enforce it, and it exists as an informal document. Housing societies that operate without licenses across the suburbs show clear signs of poor control by government agencies and regulatory departments. Present planning requires us to exchange basic administrative steps for an integrated and community-involved system that holds official power.

Environmental deterioration proved to be the foremost important factor in this study. Continuous urbanization in Lahore destroyed 25% of its green areas from 1990 to 2020 while increasing built-up areas and heat through buildings to an unacceptable level. Despite progress through initiatives like urban greening and the Ravi Riverfront Project, leadership needs to guard these programs with permanent climate stability requirements and equal access design. All sectors need to take immediate action against air pollution in Lahore because the city ranks as one of the world's most polluted areas in 2023 and 2024.

The review documents how cities are divided strictly between their wealthy and poor areas. DHA gated communities and Bahria Town exist next to large makeshift settlements and informal neighbourhoods that demonstrate serious social segregation between different communities. The planning system builds special facilities for privileged citizens, then pushes poor people both physically and politically to the side. Urban planning follows a top-down model that excludes public input because engagement methods remain weak.

While public transportation options the Orange Line and Metrobus, bring benefits to Lahore, the systems need better integration with local transportation and convenient access for pedestrians and travellers. Road-bound development remains the main pattern, which worsens road congestion and creates pollution along with land-use waste.

The establishment of PLRA and Lahore Waste Management Company, plus the Punjab Cities Program, shows how government institutions implement useful, large-scale breakthroughs. The structure of governance threatens the full utilization of government initiatives because decision makers change often, and departments operate separately from one another. Lahore still prefers constructing major infrastructure projects even when these projects neglect fairness and create environmental challenges.

Lahore represents a common scenario among Global South megacities, as local authorities often react slowly and work under limited resources with fragmented institutions. Urban managers should unite smart digital systems with green spaces to involve people in decisions that enforce planned land use.

Over the past 30 years, Lahore has started several planning efforts, yet their poor and uneven execution has stopped them from producing significant results. The path to sustainable urban growth in Lahore needs to transition from current exclusive planning practices to an approach that involves all citizens to build climate-resistant communities with strong governance. The necessary shift demands better institutional oversight over planning and includes broader stakeholder involvement, while introducing resilient water systems into development plans, plus legal backing for their implementation.

X. CONCLUSION

Over the past three decades, Lahore has transformed into one of South Asia’s fastest-growing urban centres. While urban development kept advancing along with infrastructure and economic changes throughout the last decades, Lahore continued facing regular difficulties in running the city and protecting nature. The report shows clear results because many different planning methods, like Master Plans and mass transit plans, produced limited positive outcomes across property elements.

A self-serving approach of top planners results in unchecked city expansion that strains resources and creates more distance between people. Lahore proves the need for a united urban framework that combines both planning participation and inter-departmental collaboration to make its policies more effective.

The city of Lahore needs to establish forward-looking urban planning that includes open communication methods to involve citizens and uses detailed facts in making decisions. The city needs to change the way it handles matters to fulfill both the needs of its current residents and prepare for future growth.

XI. A WAY FORWARD

Lahore needs a strong approach to solve its urban problems by changing how the city designs developments and oversees urban growth. Our outcome proves that mixed authorities combined with poor enforcement tools and heritage planning standards make it hard for Lahore to handle its fast population growth. Despite inadequate master plan enforcement, the city still sees unplanned growth and hidden housing development. Specialized planning bodies and local leaders need legal help and training to coordinate better against urban growth challenges. City planners should work with complete data while involving everyone to make sure different urban elements serve one common development goal. Establishing digital land systems helps us keep track of ownership data

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more effectively and detect misconduct more reliably. Planners must put environmental strength at the heart of their plans, which requires funding green zones, better drainage systems, and transport choices that protect the environment. The city must tackle systemic issues before it can create better opportunities and protect nature if it wants to prevent these problems from getting worse. The city will succeed in creating a sustainable living space by working together and using proven techniques.

XII. ACKNOWLEDGMENT

I truly thank my supervisor for helping me and giving useful advice during this research. I am also very thankful to my family and well-wishers for their support, good suggestions, and encouragement. Most importantly, I thank God for giving me the strength and guidance to complete this work successfully.

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