

Urban Growth Dynamics and Spatial Structure of Major Saudi Cities (Evidence from 2010–2030)

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ABSTRACT

Saudi Arabia has experienced substantial urban transformation during recent decades as a result of rapid demographic growth, economic diversification, and large-scale infrastructure development. This study provides a comprehensive analysis of urban growth patterns in Saudi Arabia between 2010 and 2024 and presents projections of urbanization trends toward 2030. The research employs demographic statistics, comparative analysis of major metropolitan centers, and spatial visualization techniques to examine the dynamics of urban expansion. The findings indicate that the national urbanization rate increased from approximately 82% in 2010 to more than 85% in 2024 and is projected to reach nearly 86–87% by 2030. Major cities including Riyadh, Jeddah, Makkah, Madinah, and Dammam continue to dominate the national urban system and represent the primary centers of economic activity and population concentration. The analysis also highlights the role of Vision 2030 initiatives, infrastructure expansion, and large-scale development projects in shaping the evolving spatial structure of Saudi cities. The study concludes that sustainable urban planning and balanced regional development strategies will be essential for managing continued urban expansion and ensuring long-term urban resilience in the Kingdom.

Keywords: Urban Growth, Urbanization, Saudi Cities, Spatial Development, Vision 2030.

1. Introduction

Urbanization has become one of the most significant global processes (United Nations, 2019; UN-Habitat, 2022) shaping economic development, demographic distribution, and spatial organization. Cities function as major centers of economic activity, technological innovation, and population concentration. According to the United Nations, more than half of the world's population currently resides in urban areas, and this proportion is expected to increase considerably over the coming decades (United Nations, 2019).

Urban growth is closely associated with structural economic transformation and the concentration of employment opportunities within metropolitan regions. Large cities benefit from agglomeration economies, where the proximity of firms, institutions, and skilled labor enhances productivity, innovation, and economic efficiency (Glaeser, 2011; Batty, 2013; Scott, 2011).

In the Middle East and Gulf region, urbanization has accelerated rapidly during the past five decades due to economic development, infrastructure expansion, and demographic growth. Saudi Arabia represents one of the most prominent examples of this transformation, where large metropolitan areas have expanded significantly as a result of economic diversification policies and large-scale infrastructure investments (World Bank, 2023).

Recent national documentation of urban development trends indicates that Saudi cities have experienced sustained growth driven by economic reforms and infrastructure development associated with Vision 2030 (Al-Jarallah, 2025). These transformations have reshaped the spatial structure of the national urban system and strengthened the role of major metropolitan centers as drivers of economic activity.

Understanding the dynamics of urban growth in Saudi Arabia is therefore essential for both academic research and policy development. Documenting urbanization trends provides valuable insights into population distribution, infrastructure demands, and spatial development patterns. Furthermore, analyzing the structure of the national urban system can help identify opportunities for balanced regional development and sustainable urban planning.

This study aims to examine urban growth trends in Saudi Arabia between 2010 and 2024 and to analyze the spatial structure of major metropolitan centers. By combining demographic statistics, comparative city growth analysis, and spatial visualization techniques, the research provides a comprehensive overview of urban transformation in the Kingdom. The study also presents projections of urbanization trends toward 2030 and discusses the implications of these trends for future urban development.

Despite the growing body of literature on urbanization, limited attention has been given to the spatial integration between major Saudi cities and the emergence of development corridors (Seto et al., 2021).

2. Literature Review

Urbanization has long been recognized as a fundamental process shaping economic development and spatial transformation. Cities serve as focal points for economic activity, innovation, and demographic concentration. Theoretical perspectives on urbanization emphasize the importance of agglomeration economies, where firms and industries benefit from spatial proximity, shared infrastructure, and large labor markets.

Glaeser (2011) argues that cities function as engines of economic productivity because dense urban environments facilitate knowledge exchange and specialization. Similarly, Batty (2013) describes cities as complex systems in which social, economic, and spatial interactions continuously shape patterns of growth and development.

Classical urban economic theory suggests that urban growth occurs when economic opportunities attract population migration toward cities. As employment opportunities expand and infrastructure improves, urban centers become increasingly attractive to both domestic and international migrants. This process leads to greater urban concentration and the expansion of metropolitan regions. However, rapid urbanization may also generate challenges such as housing shortages, transportation congestion, environmental degradation, and spatial inequality if growth is not effectively managed.

Urban planning scholars emphasize that sustainable urban development requires coordinated strategies that balance economic growth with environmental sustainability and social well-being. Newman and Kenworthy (2015) highlight the importance of integrated planning approaches that promote efficient land use, sustainable transportation systems, and resilient urban infrastructure. (Newman & Kenworthy, 2015; Bibri & Krogstie, 2020)

In recent decades, the concept of smart cities has emerged as an important framework for managing urban growth. Smart city initiatives involve the use of digital technologies, data analytics, and geographic information systems (GIS) to monitor urban processes and support evidence-based planning decisions (Townsend, 2013; Bibri, 2021).

Urbanization trends in the Gulf region differ from those observed in many other parts of the world. Economic development driven by oil revenues has enabled governments in the region to invest heavily in infrastructure, housing, and urban development projects. As a result, many Gulf countries have experienced extremely rapid urban growth within a relatively short period (World Bank, 2023).

Saudi Arabia represents a particularly significant case of rapid urban transformation. Government investments in transportation networks, housing programs, and industrial development have played a central role in shaping urban expansion across the Kingdom (Al-Hathloul, 2018). Cities such as Riyadh, Jeddah, and Dammam have evolved into major metropolitan regions that concentrate population, economic activity, and infrastructure.

While previous studies have examined urban growth in Saudi Arabia, limited attention has been given to the spatial integration between major metropolitan centers and the emergence of development corridors. This study attempts to fill this gap by combining demographic analysis with spatial visualization techniques.

These studies provide a strong foundation for understanding urban growth; however, limited research has focused on spatial corridor formation in Saudi Arabia.

3. Study Area

Saudi Arabia occupies the largest territory in the Arabian Peninsula, covering approximately 2.15 million square kilometers. The Kingdom is characterized by a vast geographic landscape that includes desert regions, coastal plains along the Red Sea and the Arabian Gulf, and mountainous areas in the southwest. Despite this extensive geographic area, the majority of the population is concentrated in urban centers that function as economic, administrative, and industrial hubs.

The spatial organization of Saudi Arabia's urban system reflects the interaction between economic development, transportation infrastructure, and government planning policies. Major metropolitan areas have emerged as dominant nodes within the national urban hierarchy. These cities concentrate population, employment opportunities, and economic activities, thereby attracting internal migration and supporting further urban expansion.

Riyadh, the capital city, represents the largest metropolitan region in the Kingdom and serves as the primary administrative and political center. Located in the central region, Riyadh has experienced rapid population growth and significant spatial expansion over the past four decades. Government institutions, financial services, and major infrastructure projects are concentrated in the city, reinforcing its role as the principal growth pole in the national urban system. (General Authority for Statistics, 2022).

Jeddah, located along the Red Sea coast, represents the second largest metropolitan area in the Kingdom. The city functions as a major commercial gateway and maritime port connecting Saudi Arabia with global trade networks. Jeddah also plays a critical role in serving the pilgrimage economy associated with Makkah and Madinah. The city's strategic coastal location has facilitated the development of logistics, transportation, and tourism activities. (Ministry of Economy and Planning, 2023).

Makkah and Madinah hold unique positions within the Saudi urban hierarchy due to their religious significance. These cities represent the two holiest locations in Islam and attract millions of pilgrims annually during the Hajj and Umrah seasons. The continuous flow of pilgrims has required significant investments in infrastructure, transportation systems, and urban services. As a result, both cities have experienced considerable urban growth and spatial transformation.

In the Eastern Province, the metropolitan region centered around Dammam forms an important industrial and energy hub. The cities of Dammam, Dhahran, and Al-Khobar together form a large metropolitan area closely linked to Saudi Arabia's oil and gas industry. The presence of major industrial facilities, energy infrastructure, and port facilities has reinforced the economic importance of this region.

Another significant component of the Saudi urban system is the industrial city of Jubail. Established as part of a national strategy to diversify the economy and expand petrochemical production, Jubail has developed into one of the largest industrial complexes in the world. The integration of industrial production, residential areas, and service infrastructure has made Jubail a key example of planned industrial urbanization.

The spatial distribution of these metropolitan centers reveals the presence of several major development corridors within the national urban system. The western corridor connecting Jeddah, Makkah, and Madinah forms a major axis associated with religious tourism and pilgrimage activities. The central-eastern corridor linking Riyadh with Dammam and Jubail represents a major industrial and economic axis supported by transportation and logistics infrastructure.

Understanding the geographic distribution and functional roles of these cities is essential for analyzing urban growth patterns in Saudi Arabia. The concentration of population and economic activities in these metropolitan regions reflects the broader dynamics of national development and economic transformation. The present study therefore focuses on documenting urban growth trends in these major cities and examining their roles within the national urban system.

4. Data Sources

The analysis presented in this study is based on demographic and urban statistics obtained from several national and international sources. These include the Saudi Population Census conducted by the General Authority for Statistics (2022), international urban datasets maintained by the United Nations and the World Bank, and national documentation of urban development trends prepared by Al-Jarallah (2025). Additional urbanization indicators were obtained from international databases maintained by the United Nations and the World Bank. (United Nations, 2019; World Bank, 2023)

These datasets include information on national urban population shares, demographic projections, and comparative statistics related to urban growth. The use of internationally recognized datasets ensures consistency and comparability with global urbanization studies.

Historical population statistics for major Saudi cities were compiled from earlier census reports and national statistical publications. These data allow for the analysis of population growth trends between 2010 and 2022. By examining changes in population size over this period, it is possible to identify cities experiencing rapid expansion and to evaluate the relative growth rates of major metropolitan centers.

The integration of these datasets allows for a comprehensive analysis of urban growth patterns and provides a reliable empirical foundation for examining demographic and spatial changes across Saudi cities.

Urbanization indicators were also derived from national development reports related to Saudi Vision 2030. These reports provide information on infrastructure investment, housing programs, and major development projects that influence urban growth

patterns. The integration of demographic data with development indicators allows for a more comprehensive understanding of the drivers of urban expansion.

Spatial data used in this research were obtained from geographic coordinates associated with major Saudi cities. These coordinates were utilized to construct spatial maps illustrating the distribution of metropolitan centers across the Kingdom. Geographic information system techniques were applied to visualize urban networks and development corridors connecting major cities.

Together, these datasets provide a robust empirical foundation for analyzing urban growth patterns in Saudi Arabia. The combination of census statistics, international urban indicators, and spatial visualization techniques allows for a comprehensive assessment of urbanization trends and the structure of the national urban system.

5. Methodology

This study adopts a quantitative analytical approach that integrates demographic analysis with spatial visualization techniques. Also, the study adopts a descriptive-analytical and spatial approach, combining statistical analysis with GIS-based visualization. (Komninos, 2015).

The methodology is designed to document urban growth patterns in Saudi Arabia and to examine the spatial structure of the national urban system.

The first component of the methodology involves the analysis of national urbanization trends. The proportion of the population residing in urban areas was examined for the period between 2010 and 2024. Time-series analysis was used to identify long-term growth patterns and to estimate the average annual increase in the national urbanization rate. These trends provide a basis for projecting urbanization levels toward the year 2030.

The second component of the methodology focuses on comparative population growth among major Saudi cities. Population data for Riyadh, Jeddah, Makkah, Madinah, and Dammam were analyzed in order to evaluate differences in urban expansion patterns. Growth rates were calculated using the standard demographic growth formula:

Growth Rate (%) =

$$((\text{Population in 2022} - \text{Population in 2010}) \div \text{Population in 2010}) \times 100$$

This calculation enables the identification of cities experiencing faster growth and highlights regional variations in urban development dynamics.

The third component of the methodology involves spatial analysis of the national urban system. Geographic Information System (GIS) techniques were employed to visualize the spatial distribution of major metropolitan centers. Mapping these cities provides insights into spatial relationships between urban nodes and the development corridors connecting them.

The final component of the methodology involves graphical visualization techniques used to present urban growth patterns. Statistical charts and spatial maps were developed to illustrate national urbanization trends, comparative city growth rates, and the spatial configuration of major metropolitan regions. These visual tools

enhance the interpretation of demographic and spatial data and contribute to a clearer understanding of urban transformation processes in Saudi Arabia.

6. Results

The analysis of demographic statistics and spatial indicators reveals several significant trends in the evolution of urbanization in Saudi Arabia between 2010 and 2024. The results demonstrate a steady increase in the national urbanization rate, continued population growth in major metropolitan centers, and the emergence of spatial development corridors connecting key cities across the Kingdom.

According to the General Authority for Statistics (2022), Saudi Arabia's total population exceeded 32 million in 2022, with more than 84 percent of the population residing in urban areas. This trend reflects the ongoing concentration of population in metropolitan regions characterized by higher levels of economic activity, employment opportunities, and infrastructure development.

6.1 National Urbanization Trends

Saudi Arabia has experienced a sustained increase in the proportion of its population living in urban areas. In 2010, approximately 82 percent of the population resided in cities. By 2024, this proportion had increased to more than 85 percent, reflecting continued migration toward urban centers and the expansion of metropolitan regions. Projections based on historical growth trends indicate that the national urbanization rate may reach approximately 86–87 percent by 2030 (United Nations, 2019)

Table 1 Urbanization Trend in Saudi Arabia (2010–2030)

Year	% Urban Population
2010	82.0
2015	83.5
2020	84.5
2024	85.2
2030*	86.3

The continuous increase in urbanization reflects broader structural changes in the Saudi economy, including economic diversification, industrial development, and infrastructure expansion. (World Bank, 2023)

Urbanization Trend in Saudi Arabia (2010-2030)

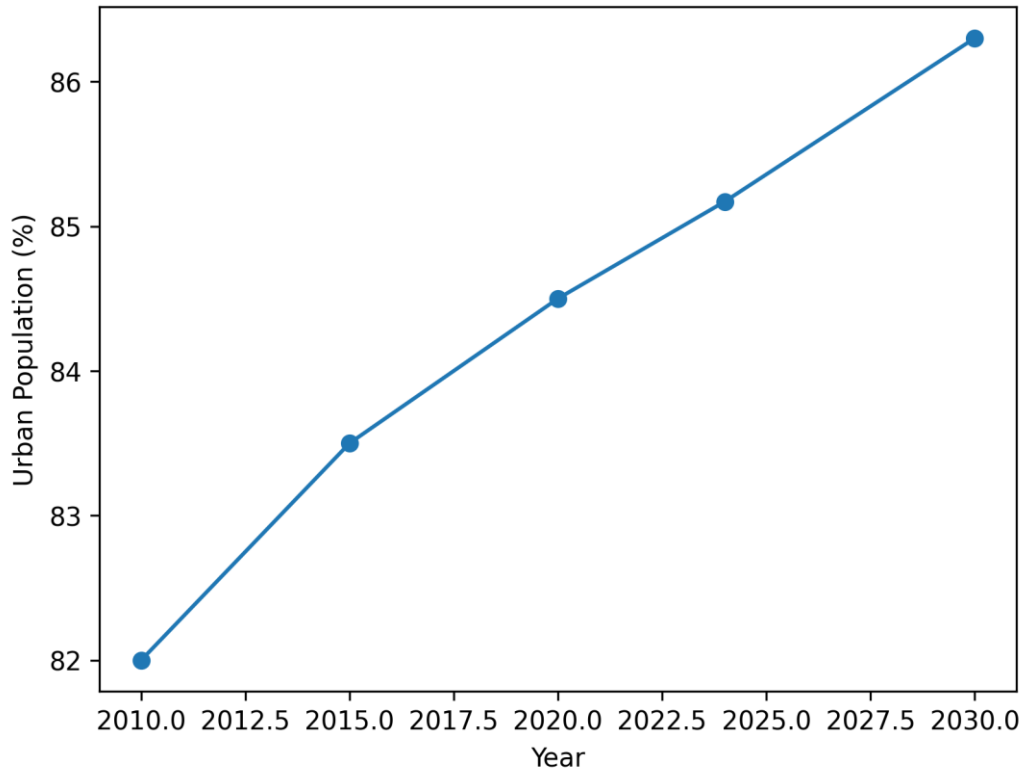


Figure 1. Urbanization Trend in Saudi Arabia (2010-2030)

Saudi Arabia has experienced a steady increase in urbanization over the past decades. The proportion of the population living in urban areas increased from approximately 82% in 2010 to more than 85% in 2024 and is projected to reach nearly 86–87% by 2030, reflecting the continuing concentration of population in major urban centers (Figure 1).

6.2 Population Distribution in Major Cities

The Saudi urban system is dominated by a limited number of large metropolitan centers that concentrate population and economic activities. Riyadh represents the largest city in the Kingdom, followed by Jeddah, Makkah, Madinah, and Damman.

Table 2. Population of Major Saudi Cities (2022)

City	Population
Riyadh	6,924,566
Jeddah	3,712,917
Makkah	2,385,509
Madinah	1,411,599
Dammam	1,386,166

The concentration of population in these cities reflects the hierarchical structure. Riyadh functions as the primary administrative and financial center, while Jeddah serves as the Kingdom's major commercial gateway along the Red Sea coast. (Glaeser, 2011).

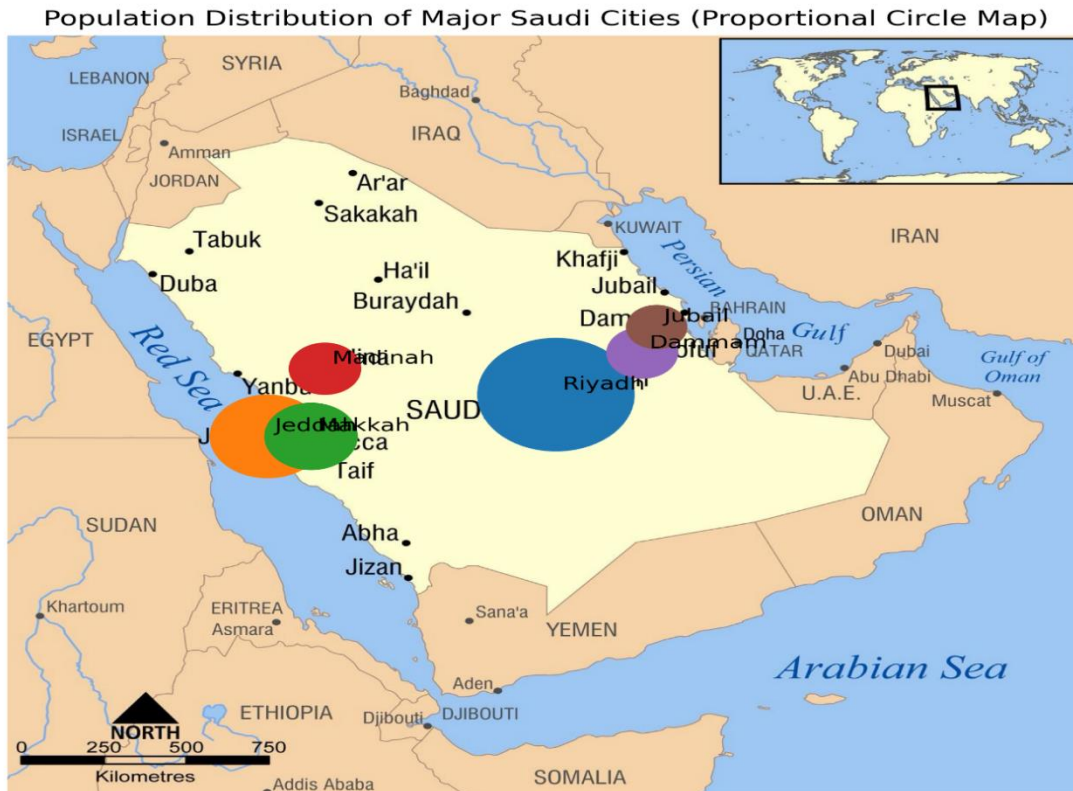


Figure 2. Population distribution of major Saudi cities using proportional circle representation.

The spatial distribution of population across major Saudi cities reveals a strong concentration in a limited number of metropolitan centers. Riyadh represents the largest urban agglomeration, followed by Jeddah and Makkah, while Madinah and Dammam constitute important regional centers. This pattern is illustrated through proportional circle representation in Figure 2.

6.3 Comparative Urban Growth Rates

Analysis of population growth between 2010 and 2022 reveals considerable variation among major Saudi cities.

Table 3. Urban Growth Rates of Major Cities (2010–2022)

City	Growth rate%
Dammam	54
Makkah	40

Riyadh	33
Madinah	28
Jeddah	9

Dammam recorded the highest growth rate during the study period. This reflects the concentration of industrial and energy-related activities in the Eastern Province. The expansion of industrial and energy-related activities in the Eastern Province has contributed significantly to population growth in this region. Makkah also experienced strong demographic expansion due to the development of pilgrimage infrastructure and tourism-related services.



Figure 3. Urban growth rates of major Saudi cities using proportional circle representation (2010–2022).

Urban growth rates differ significantly among major Saudi cities. Dammam and Makkah exhibit the highest growth rates, reflecting industrial expansion and religious tourism respectively, while Riyadh and Madinah demonstrate moderate growth patterns. Jeddah shows comparatively lower growth during the study period. The spatial distribution of these growth patterns is presented in Figure 3.

Riyadh's growth reflects its role as the national capital and the concentration of government institutions, financial services, and infrastructure projects. Madinah also experienced moderate growth associated with pilgrimage activities and regional development. Jeddah, although remaining one of the largest cities in the Kingdom, recorded a relatively lower growth rate compared with other metropolitan areas.

6.4 Spatial Distribution of Major Cities

Mapping the geographic locations of major metropolitan centers reveals the spatial configuration of the Saudi urban system. The distribution of cities reflects both historical development patterns and the influence of economic activities such as trade, industry, and religious tourism.

Spatial Structure of Major Saudi Metropolitan Centers and Development Corridors



Figure 4. Spatial structure of major Saudi metropolitan centers and development corridors

The spatial structure of the Saudi urban system is characterized by a set of dominant metropolitan centers connected through major development corridors. The western corridor linking Jeddah, Makkah, and Madinah reflects the religious and service-oriented urban axis, whereas the eastern corridor connecting Riyadh, Dammam, and Jubail highlights the industrial and economic axis of the Kingdom. This spatial configuration is illustrated in Figure 4.

6.5 National Urban System Structure

A broader spatial perspective reveals the hierarchical structure of Saudi Arabia's national urban system. The distribution of metropolitan centers reflects a pattern of regional specialization and economic interdependence.

The spatial structure highlights the central role of Riyadh as the administrative and economic core of the Kingdom. The western coastal region forms an important commercial and religious cluster, while the Eastern Province represents the country's primary industrial and energy region.

6.6 Development Corridors

Spatial analysis also reveals the emergence of several development corridors connecting major cities. These corridors represent key axes of economic activity, transportation infrastructure, and regional integration.

Two major corridors are particularly significant. The first corridor links Jeddah, Makkah, and Madinah and represents the main pilgrimage and tourism axis of the Kingdom. The second corridor connects Riyadh with Dammam and Jubail, forming an industrial and economic corridor associated with energy production and manufacturing activities.

These corridors illustrate how infrastructure investment and economic development initiatives are shaping the spatial organization of the national urban system. Improved transportation networks, logistics facilities, and industrial clusters have strengthened connections between cities and contributed to the emergence of integrated regional economies.

7. Discussion

The results highlight several important dimensions of urban transformation in Saudi Arabia. The steady increase in the national urbanization rate reflects broader structural changes occurring within the Kingdom's economy and society. Economic diversification policies, industrial development, and large-scale infrastructure investments have encouraged the concentration of population in urban areas.

The rapid expansion of metropolitan regions such as Riyadh, Jeddah, and Dammam illustrates the role of cities as engines of economic growth. (Glaeser, 2011; Batty, 2013).

Large metropolitan areas benefit from agglomeration economies, where the proximity of firms, institutions, and skilled labor enhances productivity and innovation (Glaeser, 2011). These findings are consistent with Glaeser (2011) and Batty (2013), who emphasize the role of metropolitan concentration in driving economic productivity.

The spatial structure of the Saudi urban system also reflects regional specialization. (Scott, 2011). Riyadh functions as the administrative and financial center of the Kingdom, while Jeddah serves as a commercial gateway connecting Saudi Arabia to international trade networks. Makkah and Madinah represent major religious and tourism centers, whereas Dammam forms the core of the industrial and energy sector in the Eastern Province.

Despite the benefits associated with urban growth, rapid urbanization also presents several challenges. Increasing population densities place pressure on housing markets, transportation systems, and urban infrastructure. Traffic congestion, environmental

pollution, and rising infrastructure costs represent common challenges faced by rapidly expanding metropolitan regions.

8. Spatial Development Implications

The spatial distribution of Saudi Arabia's metropolitan centers suggests the emergence of several development corridors that structure the national urban system. These corridors represent geographic axes along which economic activity, transportation infrastructure, and population growth are concentrated.

The western corridor connecting Jeddah, Makkah, and Madinah represents one of the most important spatial structures within the Kingdom. This corridor supports religious tourism and pilgrimage activities and has benefited from significant investments in transportation infrastructure, including highways and high-speed rail systems.

The central-eastern corridor linking Riyadh with Dammam and Jubail represents another critical axis of economic activity. This corridor connects the administrative center of the Kingdom with its primary industrial and energy hub.

9. Conclusion

This study examined urban growth trends in Saudi Arabia between 2010 and 2024 and analyzed the spatial structure of the national urban system. The findings indicate that Saudi Arabia has experienced sustained urban expansion driven by demographic growth, economic development, and infrastructure investment.

Urbanization levels increased from approximately 82 percent in 2010 to more than 85 percent in 2024, with projections suggesting that the national urbanization rate may reach nearly 86–87 percent by 2030.

Major metropolitan areas including Riyadh, Jeddah, Makkah, Madinah, and Dammam continue to dominate the Saudi urban hierarchy and represent the primary centers of economic activity.

The emergence of development corridors connecting major cities highlights the importance of infrastructure investment and regional integration in shaping the spatial organization of the national urban system.

These findings contribute to the growing body of research on urban transformation in rapidly developing economies. As Saudi Arabia continues to implement Vision 2030 initiatives, urban planning policies will play a crucial role in ensuring sustainable urban growth and balanced regional development. These findings are consistent with global urbanization trends observed in rapidly developing economies (UN-Habitat, 2022; World Bank, 2023).

Future research may explore the impact of emerging mega-projects and smart city initiatives on the evolution of the Saudi urban system.

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