

Vertical Expansion and Urban Dynamics: The Impact of Tower Projects in Morocco

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ABSTRACT: This paper primarily endeavors to investigate the emergence and proliferation of tower developments in Morocco, aiming to elucidate the dynamics of urban verticalization and assess how these transformations can align with comprehensive urban planning policies, social expectations, and sustainability goals. In recent decades, Morocco has experienced rapid and sustained urbanization, particularly in Casablanca, Rabat, and Tangier, where vertical development through high-rise tower projects has become increasingly prevalent. These constructions address multiple urban imperatives by maximizing the efficient use of scarce land, accommodating growing populations, stimulating economic growth, and enhancing the symbolic stature of metropolitan centers. However, the expansion of tower projects also poses significant challenges, including integration into existing urban fabrics, preservation of landscape coherence, mobility and accessibility constraints, limited functional diversity, and environmental sustainability concerns. In fact, analyzing the drivers, spatial patterns, and socio-environmental impacts of vertical growth, this study provides critical insights into contemporary urban restructuring in Morocco and offers strategic guidance for policymakers, planners, and stakeholders striving to achieve sustainable and inclusive urban development.

KEYWORDS: Urbanization, Tower Projects, Morocco, Urban Planning, Vertical Growth, Sustainability, Urban Transformation

1. INTRODUCTION

Morocco has witnessed profound urban transformations over the past few decades, driven by sustained population growth, rural-to-urban migration, and rapid socio-economic development. According to the High Commission for Planning (HCP, 2024), Morocco's urban population has increased steadily, with urban centers now accommodating over 60% of the national population. This demographic shift has placed immense pressure on existing urban infrastructure and housing, prompting cities to explore innovative solutions for accommodating growing populations. One notable trend has been the emergence of vertical urbanization through high-rise and tower projects, particularly in major cities such as Casablanca, Rabat, and Tangier (Medias24, 2024; Mordor Intelligence, 2025).

Vertical development has become a critical strategy for addressing multiple urban imperatives. Firstly, it optimizes the use of limited land in densely populated areas, allowing cities to expand upward rather than outward. This is especially significant in metropolitan areas where horizontal expansion is constrained by natural features, agricultural land, or heritage zones. Secondly, tower projects contribute to economic growth by providing high-value office space, commercial centers, and residential units that attract investment and foster job creation (Blog Trotter, 2024). In addition, the symbolic role of towers in defining a city's skyline and identity cannot be understated; high-rise buildings often serve as markers of modernization and global connectivity.

Despite these advantages, the rapid proliferation of tower projects introduces several challenges. Integrating tall buildings into existing urban fabrics requires careful consideration of architectural coherence, heritage preservation, and neighborhood character. Many Moroccan cities, particularly Rabat and Marrakech, have historical cores with cultural and aesthetic significance, and vertical developments risk disrupting these areas if not carefully managed. Additionally, high-rise buildings influence urban mobility, as increased population density places pressure on transportation networks and public services. Functional diversity, which ensures that cities offer a balanced mix of residential, commercial, and recreational spaces, may be compromised if vertical developments are poorly planned. Environmental sustainability is another key concern, as tall buildings often entail higher energy consumption, complex waste management, and increased carbon footprints (El-Mourabet, 2023; Rahimi et al., 2022).

Theoretical frameworks on urban verticalization emphasize the interplay between economic imperatives, population dynamics, and urban planning policies. Scholars argue that vertical growth is not merely a spatial phenomenon but a complex socio-economic

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process that reshapes urban life, social interactions, and access to resources (Glaeser, 2011; Angel et al., 2012). In Morocco, verticalization intersects with broader development agendas, including modernization, economic competitiveness, and international positioning. Casablanca, as the country's economic hub, exemplifies this intersection, with projects such as the Casablanca Finance City Tower symbolizing both economic vitality and global aspiration. Similarly, Tangier's rapid transformation into a port and logistics hub has been accompanied by vertical construction, reflecting the city's strategic economic role.

Social implications of verticalization are equally significant. While high-rise developments can provide solutions to housing shortages, they may also exacerbate social inequalities. High property values and rental costs can lead to socio-spatial segregation, displacing lower-income populations and creating pockets of exclusivity. Urban planners and policymakers must therefore consider how vertical growth can be managed to promote inclusive urban environments that cater to diverse socio-economic groups. Furthermore, residents' perceptions of tower projects—ranging from aspirations for modern living to concerns about overcrowding and social isolation—play a critical role in shaping the acceptance and success of these developments (El-Mourabet, 2023).

Environmental sustainability remains a pressing concern in Morocco's urban verticalization. High-rise buildings, by their very nature, consume substantial amounts of energy for heating, cooling, and elevator operations. In densely built areas, they also contribute to urban heat islands and can strain water and waste management systems. Sustainable building practices, such as energy-efficient designs, green roofs, and environmentally friendly materials, are therefore essential to mitigate these impacts. Incorporating sustainability principles into tower projects not only aligns with global environmental imperatives but also enhances the long-term livability and resilience of Moroccan cities (Rahimi et al., 2022).

In this context, examining Morocco's vertical urbanization offers valuable insights into the mechanisms of contemporary urban transformation. By analyzing the drivers, patterns, and socio-environmental impacts of tower projects, this study seeks to illuminate how vertical growth reshapes urban space and influences social and economic dynamics. It also explores the extent to which urban planning frameworks, policy measures, and community engagement can harmonize vertical development with sustainability, heritage preservation, and social inclusivity.

Ultimately, this research underscores the complexity of urban verticalization in Morocco, emphasizing that high-rise developments are not merely architectural interventions but transformative processes that reshape the urban fabric, redefine social interactions, and influence environmental outcomes. By situating Moroccan tower projects within broader global and regional urbanization trends, this study provides a comprehensive understanding of the opportunities and challenges associated with vertical growth and offers evidence-based guidance for policymakers, planners, and stakeholders striving to create sustainable, resilient, and inclusive urban environments.

2. RESEARCH DESIGN

This study employs a mixed-methods research design, integrating both qualitative and quantitative approaches to provide a comprehensive understanding of vertical urbanization in Morocco. The combination of methodologies allows for triangulation of data, enhancing the reliability and validity of the findings (Creswell & Plano Clark, 2017). Specifically, the research investigates the drivers, spatial patterns, and socio-environmental impacts of tower projects in Casablanca, Rabat, and Tangier. The study also examines the alignment of vertical urban growth with urban planning policies, sustainability objectives, and social expectations.

2.1 Data Collection Methods

Data collection for this study is multi-faceted, drawing from primary and secondary sources to comprehensively assess the impacts of tower projects:

1. Document and Policy Analysis – Official reports from the High Commission for Planning (HCP), Medias24, and Mordor Intelligence were reviewed to identify trends in population growth, urban expansion, and tower project development. Urban planning regulations, building codes, and environmental assessments were also analyzed to understand the policy framework guiding vertical urbanization.
2. Field Observations – On-site visits to tower projects in Casablanca, Rabat, and Tangier provided direct insights into their integration within existing urban fabrics. Observations focused on building design, accessibility, surrounding infrastructure, functional diversity, and neighborhood interactions.
3. Geospatial and Statistical Analysis – Geographic Information System (GIS) tools were used to map the distribution of tower projects, analyze spatial patterns, and assess land use changes. Quantitative data on population density, housing availability, and urban infrastructure were analyzed using descriptive and inferential statistics to understand the correlations between vertical growth and urban development indicators.

2.2 Sampling

The study employs purposive and stratified sampling strategies to ensure representation of diverse urban contexts and stakeholder perspectives.

1. Case Study Selection – Three Moroccan cities were selected based on their economic, political, and cultural significance, as well as the scale of vertical development:

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- Casablanca: Morocco’s economic hub, featuring large-scale high-rise projects and commercial towers.
- Rabat: The political capital, integrating vertical developments within historical and heritage-sensitive zones.
- Tangier: A rapidly growing port and logistics city with emerging high-rise residential and commercial projects.

3. LITERATURE REVIEW

Morocco's urbanization trajectory has been marked by rapid growth and spatial transformation. The OECD's National Urban Policy Review (2025) underscores the absence of a cohesive national urban policy, despite the country's urban population exceeding 60%. This policy gap has led to challenges such as urban sprawl, inadequate infrastructure, and environmental degradation. The World Bank's report on urban development in Morocco (2020) highlights the need for integrated planning to address these issues. The report emphasizes the importance of aligning urban policies with sustainable development goals to promote inclusive and resilient urban growth.

3.1 Emergence of Vertical Development

In response to urbanization pressures, Moroccan cities have increasingly adopted vertical development strategies. The Casablanca Finance City Tower, completed in 2019, exemplifies this shift. Standing at 136 meters, the tower serves as a financial hub and a symbol of Morocco's aspirations in global finance. Other notable projects include the BCP Tower in Casablanca, which, at 120 meters, ranks as the second tallest building in the city. These developments reflect a broader trend towards high-rise construction as a solution to land scarcity and urban densification.

3.2 Socio-Spatial Implications

The proliferation of high-rise buildings has significant socio-spatial implications. Bounoua et al. (2024) discuss how verticalization can lead to changes in the urban fabric, affecting aspects such as accessibility, social interactions, and community cohesion. The integration of high-rise buildings into existing neighborhoods requires careful planning to ensure compatibility with the surrounding environment and to prevent social segregation.

3.3 Environmental Sustainability and Climate Resilience

Environmental sustainability is a critical consideration in the development of tower projects. Elaouzy (2025) explores how building materials, energy consumption, and design strategies influence the carbon footprint of urban buildings in Morocco. The study emphasizes the need for sustainable construction practices to mitigate the environmental impact of high-rise developments. Furthermore, the World Bank's report on resilient buildings in Morocco (2019) highlights the importance of incorporating climate resilience into urban planning. The report advocates for the adoption of building codes that enhance the safety and sustainability of urban structures in the face of climate change.

3.4 Policy and Planning Frameworks

The OECD's National Urban Policy Review (2025) provides an in-depth analysis of the trends, challenges, and opportunities of urban development in Morocco. The review suggests the need for a formalized national urban policy to address issues such as urban sprawl, inadequate infrastructure, and environmental degradation. It proposes a roadmap with concrete recommendations structured around four pillars: promoting competitive, inclusive, sustainable, and resilient urban development. Additionally, the Global State of National Urban Policy 2024 report by UN-Habitat emphasizes the importance of coherent urban policies that align with sustainable development goals. The report advocates for integrated planning approaches that consider the social, economic, and environmental dimensions of urbanization.

Table 1: Key Tower Projects in Moroccan Cities

City	Project Name	Height (m)	Completion Year	Purpose
Casablanca	Casablanca Finance City Tower	136	2019	Financial services hub
Casablanca	BCP Tower	120	2023	Corporate offices
Rabat	Ibn Sina University Hospital	150	2026	Healthcare and research facility
Tangier	Tétouan Tower	120	2023	Mixed-use development
Marrakech	M Tower	131	2024	Commercial and residential spaces

3.5 Technological and Analytical Tools

In Morocco, technological and analytical tools play an increasingly critical role in managing urban growth. Geographic Information Systems (GIS), remote sensing, and big data analytics are used to map urban expansion, monitor land use changes, and predict future population densities in rapidly growing cities such as Casablanca, Rabat, and Marrakech. These tools enable urban planners and policymakers to make data-driven decisions regarding infrastructure development, housing, transportation, and environmental

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sustainability. Additionally, smart city initiatives and digital platforms facilitate real-time monitoring of traffic, energy consumption, and public services, helping to optimize resource allocation in densely populated urban areas. By integrating technology and analytics into urban planning, Morocco is better equipped to balance vertical growth with sustainable city development, mitigating the challenges of sprawl and overpopulation.

3.6 Remote Sensing and Spatial Analysis

Advancements in remote sensing technologies enable the monitoring of vertical urban growth patterns. These tools provide valuable data for urban planners to assess building heights, density distributions, and spatial changes over time.

3.7 Modeling Urban Growth

Modeling techniques, including Cellular Automata (CA) and extreme value theory, are employed to predict future urban growth scenarios. These models help in understanding the dynamics of vertical expansion and assist in planning for sustainable urban futures.

3.8 Global Trends and Future Directions

Studies indicate a global shift towards vertical urban growth, with increasing building heights and densities in many cities. However, the relationship between vertical growth and population accommodation is complex. In some cases, horizontal expansion continues to be the primary driver of urban population growth. This underscores the need for targeted policies that encourage vertical development where appropriate and manage horizontal sprawl effectively.

3.9 Urban Sustainability and Vertical Growth

Bounoua et al. (2024) conducted a review assessing urban sustainability in 27 Moroccan urban areas using the UN's Sustainable Development Goal (SDG) indicator 11.3.1, which measures the ratio of Land Consumption Rate (LCR) to Population Growth Rate (PGR). Their findings indicate that many urban areas are expanding at a rate faster than population growth, highlighting the need for more efficient land use strategies, including vertical growth.

3.10 Vertical Farming Initiatives

In response to limited arable land and urbanization, vertical farming is gaining traction in Morocco. Vertical farms use stacked shelves or hydroponic systems to cultivate crops in controlled indoor environments, maximizing space and reducing transportation costs and carbon footprints associated with long-distance distribution.

A study by Paucek et al. (2023) assessed the feasibility and sustainability of indoor vertical farming in Africa, including Morocco. The study found that Morocco, along with other North African countries, shows favorable conditions for vertical farming due to factors such as urban development, food security concerns, and access to resources like water and energy.

Prillaman and Prillaman (2021) discussed the potential of hydroponics and vertical farming in Morocco, emphasizing the opportunity to grow larger quantities of produce in seemingly unavailable spaces, such as rooftops and indoor areas.



Rabat



Casablanca



Tangier

Retrieved from: <https://www.dreamstime.com>

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3.11 National Urban Policy and Vertical Growth

The OECD's National Urban Policy Review of Morocco (2025) provides an in-depth analysis of urban development trends, challenges, and opportunities in the country. The review highlights issues such as urban sprawl, housing shortages, and inadequate infrastructure, and suggests that vertical growth could be a key strategy in addressing these challenges.

3.12 Practical Examples of Vertical Growth

1. **Casablanca's Urban Mobility Enhancements:** The World Bank has supported the development of Greater Casablanca's mobility and logistics hub through a \$350 million loan. This initiative aims to improve access to jobs and essential services by strengthening the railway network, thereby supporting vertical growth in the region.
2. **Vertical Farming Projects:** Various initiatives in Morocco are exploring vertical farming techniques to address food security and sustainability. These projects aim to utilize urban spaces for food production, reducing the carbon footprint associated with traditional agriculture.

4. DATA DISCUSSION

The data collection methods employed in this study provided a multi-dimensional perspective on the impacts of tower projects within Moroccan cities. By combining document analysis, field observations, and geospatial/statistical analysis, the study was able to triangulate findings and enhance the validity of the conclusions.

1. Document and Policy Analysis:

Reviewing official reports from the High Commission for Planning (HCP), Medias24, and Mordor Intelligence allowed for a systematic understanding of urbanization trends and vertical growth patterns. The analysis of urban planning regulations, building codes, and environmental assessments highlighted the policy frameworks that shape the development of tower projects. This step was crucial for identifying the legislative and administrative context that either facilitates or constrains vertical urbanization, revealing gaps in sustainability, zoning, and social integration measures.

2. Field Observations:

On-site visits to Casablanca, Rabat, and Tangier provided qualitative insights into the real-world implications of tower projects. Observing building design, accessibility, functional diversity, and neighborhood interactions enabled the study to assess how these vertical structures integrate into the existing urban fabric. These observations were particularly valuable in understanding the social and infrastructural impacts that are not always evident in official reports or secondary data sources. For instance, field visits revealed challenges related to pedestrian accessibility, connectivity to public transit, and the availability of nearby amenities.

3. Geospatial and Statistical Analysis:

The use of Geographic Information System (GIS) tools was pivotal in mapping the distribution of tower projects and identifying spatial patterns across Moroccan cities. In Casablanca, for instance, GIS analysis highlighted clusters of high-rise developments in neighborhoods such as Maarif and Anfa, reflecting areas with high population density and commercial activity. In Rabat, the tool revealed a concentration of vertical projects around the Agdal and Hay Riad districts, which coincide with administrative centers and growing residential zones. Tangier's GIS mapping showed emerging towers primarily along the coastal corridor and near the Tanger-Med port, indicating strategic alignment with economic and transport hubs. By integrating GIS data with qualitative measures—such as population density, housing availability, and urban infrastructure—the study identified correlations between vertical growth and broader urban development indicators. Descriptive statistics provided a snapshot of existing conditions, while inferential analyses allowed for assessment of potential causal relationships, such as the link between tower proliferation and housing accessibility or traffic congestion. This combined approach proved instrumental in understanding how vertical development presents both opportunities, like optimized land use and expanded residential capacity, and challenges, including localized congestion and uneven distribution of public amenities across these cities.

Chart 1: (GIS) Mapping of Moroccan Cities: Rabat, Casablanca and Tangier

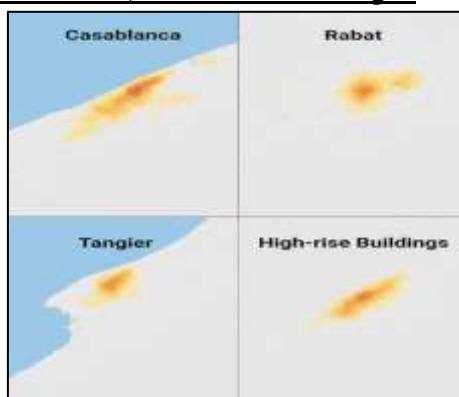
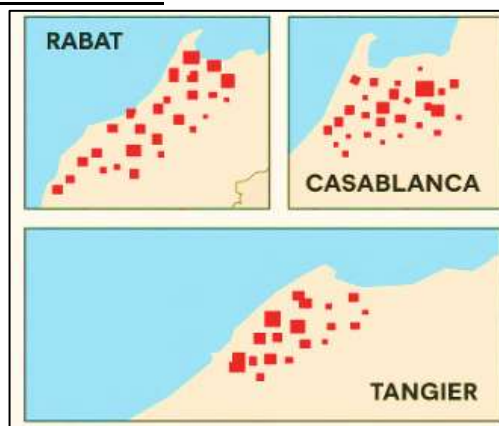


Chart 2: GIS Mapping of Tower Project Distribution



4.1 Implications:

The discussion of data collection highlights the need for coordinated urban planning strategies that consider regulatory frameworks, physical integration, and social dynamics. The findings suggest that while vertical growth offers solutions to land scarcity and urban density, careful planning is required to ensure sustainability, functional diversity, and equitable access to infrastructure and amenities.

5. CONCLUSION

Recent research demonstrates a clear global shift toward vertical urbanization, with cities increasingly characterized by taller buildings and higher densities. In Morocco, this trend is evident in major urban centers, yet the relationship between vertical growth and population accommodation remains complex. In many cases, horizontal expansion continues to drive population growth, highlighting the limitations of relying solely on vertical development. Therefore, it is essential to implement targeted policies that both promote vertical construction where appropriate and manage horizontal sprawl effectively. Ultimately, a balanced approach can support sustainable, efficient, and resilient urban growth in Morocco.

5.1 Recommendations

1. Integrate Vertical Growth into Urban Planning
 - Adopt comprehensive plans that balance horizontal expansion and vertical densification.
 - Promote mixed-use high-rise developments with public spaces.
2. Promote Environmental Sustainability
 - Implement green building standards and renewable energy solutions.
 - Use green roofs and vertical gardens to mitigate heat islands.
3. Strengthen Infrastructure and Services
 - Upgrade transportation, water, sewage, and energy systems for dense areas.
 - Encourage transit-oriented development and smart city solutions.
4. Ensure Social Equity
 - Provide affordable housing in high-rise projects.
 - Include accessible community amenities and participatory planning.
5. Leverage Technology and Data
 - Use GIS, remote sensing, and urban growth models to guide development.
 - Foster research and innovation in sustainable urban design.
6. Enhance Regulatory Frameworks
 - Update building codes for safety, resilience, and energy efficiency.
 - Enforce land-use regulations and incentivize sustainable development.

Further work

Future research should examine how vertical growth affects housing accessibility for low- and middle-income populations, the potential for displacement, and changes in community cohesion. Likewise, quantitative surveys combined with spatial analysis could illuminate patterns of social inclusion or exclusion.

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