CHAPTER 105

Port-Led Urban Transformation

Poulomee Ghosh[1] and Vaishnavi B.[2]

ABSTRACT

Ports have historically played a crucial role in urban development, acting as gateways for trade and shaping city structures. Today, port-led urban transformation has become a significant force in reshaping cities, influencing land use, infrastructure, and economic activities. As ports expand, they drive urban growth, redefine spatial organization, and reshape the relationship between the port and the city. Notably, nine of the world's ten largest cities host major ports, highlighting their significance in economic growth. In India, ports are vital for national trade and urban expansion. To establish a foundational understanding of port-city relationships, this study conducts a systematic literature review spanning five decades of research. By analyzing 30 research papers, this study explores port-city interactions and compares them with developments at JNPT, Mumbai. The port evolution framework serves as a key reference, alongside other global models of port-city evolution. The analysis highlights key factors driving port-led development, including strategic location, infrastructure, adaptability, connectivity, and land use. Findings applied to the Mumbai region align with established frameworks, providing insights into port-driven urban transformation. The study contributes to shaping strategies for sustainable port-city integration, supporting planners and policymakers in understanding evolving port-city dynamics.

Keywords: Port-led development; Urban transformation; Spatial evolution framework; Port-growth relationship; Development patterns.

1.0 Introduction

Ports are important for the global economy because they serve as centers for trade, transportation, and economic growth. A port is a place on the coast where ships stop to load and unload cargo or passengers, connecting land with the sea. This allows goods and people to move between different regions and countries, making ports essential for international trade. The development of a port helps the economy and also leads to the growth of cities around it, called port cities. These cities become important centers for trade, industry, and cultural exchange (Hayuth, 2000).

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As trade continues to grow globally, studying ports also helps us make them more efficient and well-prepared for future demands (Notteboom, 2022). The Sagarmala Project aims to promote port-led development and reduce logistics costs for both domestic and international trade by leveraging India's coastline and waterways, further reinforcing the critical role of ports in urban growth. This research looks at how ports transform cities and affect their development (India, 2021). Port-led urbanization is a significant aspect of contemporary urban and regional planning, driven by the globalization of trade, industrialization, and strategic infrastructure development. Ports serve as critical nodes in the global supply chain, influencing land use, economic activities, and urban forms in their surrounding areas (Hoyle; Rodrigue, 2011; Ducruet, 2006; Jacobs, 2007; Mitra, 2016). In this context, the transformation of cities and towns around ports involves a multifaceted approach that includes industrial growth, real estate development, and urban infrastructure expansion (Hayuth, 2000; Notteboom, 2005; Lonza, 2016).

1.1 Research gap and need of study

Rapidly growing port cities face unique challenges and opportunities as they develop. While ports have historically influenced urban development, their modern expansion presents complex challenges, particularly in balancing economic growth with sustainable urban planning. Existing research extensively covers port development and urbanization separately, but fewer studies systematically analyze port-city interactions over time and their implications for spatial planning and infrastructure development (Ducruet , 2023; Bryan, 2006). Despite the significance of ports in global trade, limited research focuses on how ports reshape cities through land use changes, connectivity demands, and economic transformations. In India, where ports play a crucial role in national trade and urban expansion, there is a noticeable gap in empirical studies linking port evolution to urban form and planning strategies.

2.0 Methodology

The methodology involves a systematic literature review on port-led urbanization, analysis of key theoretical frameworks, and case study comparisons of international port cities to understand spatial and economic transformations. An initial 1,742 papers were retrieved through keyword searches on "port-led urban transformation" and "spatial dynamics in port cities." After refining the selection, 144 papers specifically examined port-city relationships, while 113 studies focused on transformation processes within these settings. However, a Scopus search (Table 1) has revealed a significant gap in existing research on Uran, particularly regarding the socio-economic impacts and urban challenges of its rapid growth. While studies have explored port development and infrastructure in various contexts (Swamy, 2010; Zhuang, 2022), and general urban changes (Lonza, 2016), few focus on how these factors interact to affect the local economy and land use together. Additionally, there's a lack of research on how

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new infrastructure projects like airports and industries relate to port activities in shaping urban development, especially in the Uran district. This study aims to fill this gap by examining how port development impacts Uran's economy, land use, and future prospects.

Table 1: List of Keywords Used and Documents Found

Sr No	Keyword	No. of Paper
1	GIS and spatial and tools and in and port and development	29
2	Land and use and spatial and dynamics and of and ports	62
3	Port and cities and spatial and analysis	50
4	Port and cities and transformation	113
5	Port and city	450
6	Port and led and urban and transformation	16
7	Port and urban and transformation	91
8	Port and waterways and cities	68
9	Spatial growth and port-city interface	3
10	Urban and growth and patterns and port and region	14
11	Urban and morphology spatial and planning and port and expansion	1
12	Port and uran	3
13	Port and land and use	60
14	Port and urban and regeneration	22

Source: Author's own

To address the research gap, this study synthesized insights from 30 key research papers spanning five decades, analyzing the historical trends, policy interventions, and spatial-economic shifts associated with port-led urbanization. The review provides a comprehensive understanding of the factors shaping port-driven urban transformation.

Following the literature review, and to establish a conceptual foundation key theories related to port development were studied:

- Rodrigue's Three-Phase Model (growth phases of port cities)
- Hoyle's (1989) Port-City Interface Evolution (adapted in Schubert's 2011 model)
- Lee *et al.* (2008) and Lee & Ducruet (2009) on spatial evolution in Asian hub port cities.

These theories provided a structured way to analyze how ports influence urbanization and economic restructuring (Zhang, 2018).

3.0 Literature Review

3.1 Priliminary study

The concept of a port city is often poorly defined, with its meaning varying across disciplines. Both researchers and professionals have noted the lack of a clear definition, making

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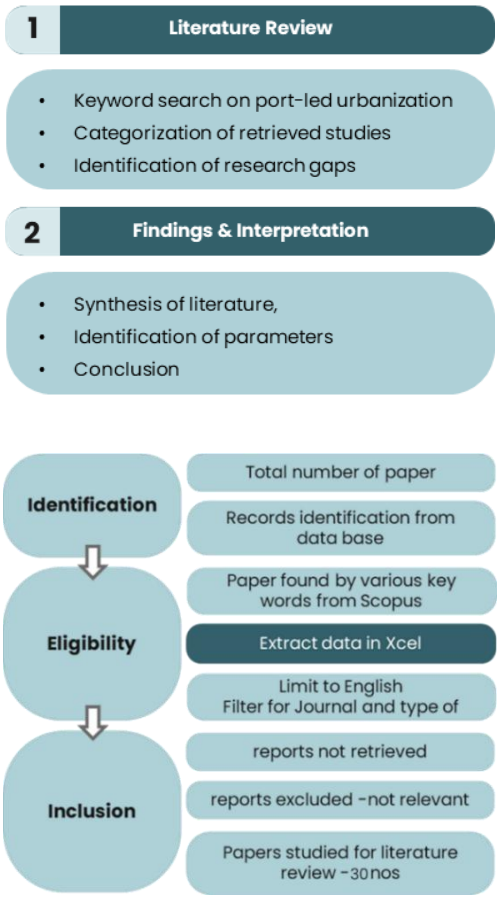
it challenging to compare port cities and develop effective redevelopment plans. Port cities are typically recognized as cities involved in port and maritime activities and serve as key communication hubs connecting land and maritime networks, shaping the spatial organization of their regions. The concept of a port city frequently overlaps with that of a gateway city, which emphasizes its role in connecting with distant maritime regions. Unlike central places, which influence only their immediate surroundings, port cities engage with both hinterlands and forelands. These relationships cover various areas such as logistics, tourism, tertiary activities, and urban planning (Ducruet, 2011).



3.2 Past studies and models

Previous studies on port development have examined multiple dimensions, including the success and failure of ports ((Notteboom, 2001; Ng, 2010), the economic impact of ports on regional development (Hall, 2007; Merk, 2013),port construction and infrastructure expansion (Kaselimi, 2011; Wang, 2000), the historical evolution of port-city relationships (Banga, 1992;

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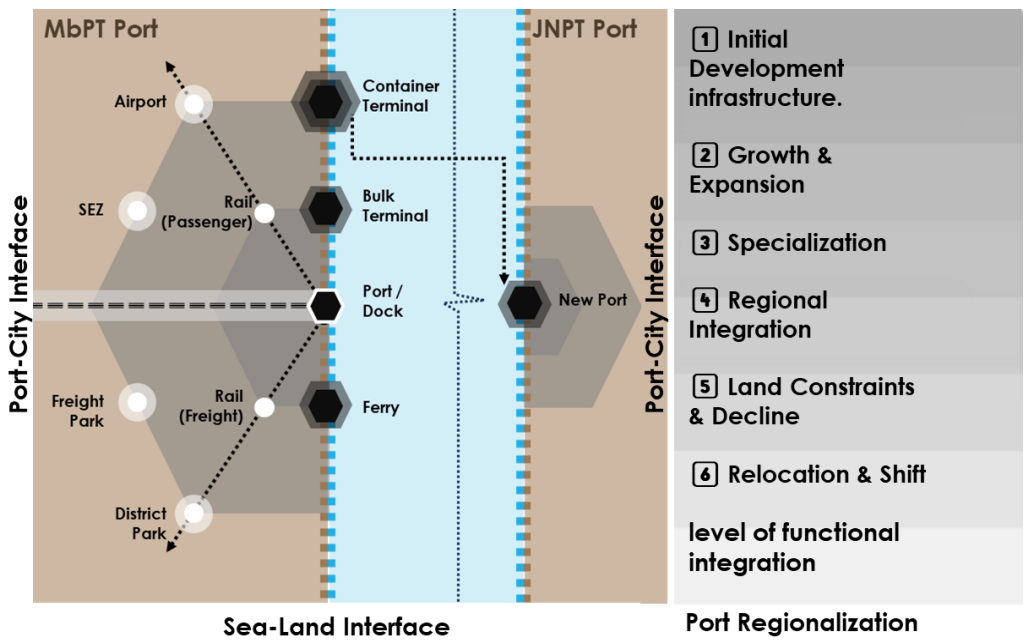
Ducruet, 2006), governance and policy frameworks in port management , and the environmental consequences of port expansion . These studies have provided valuable insights into the various roles that ports play in shaping regional and global dynamics. However, this study specifically focuses on the relationship between port growth and city development, analyzing how urbanization patterns evolve in response to port expansion. By examining spatial and economic transformations in port-led urban environments, this research aims to bridge gaps in understanding the city-port interface and its implications for urban planning

3.3 Typologies of port cities

Port-city relations and its interfaces: Jean-Paul Rodrigue described how port cities grow in stages (Figure 1), starting as small ports handling general cargo and later expanding into regional hubs with bulk and container cargo, freight distribution, and logistics services. He explained that as ports grow, they move from small quays near the city center to larger docks built farther away to meet space demands. Over time, this can lead to the old port being abandoned and redeveloped (Rodrigue, 2011; H.M. Shivanand Swamy, July - September 2010).

Figure 1: Conceptual Diagram Showing Land-Sea-Port-City Interaction



Source: Compiled by Authors

This process highlights the port-city interface model, which explains the changing spatial and functional relationships between ports and urban areas. The model outlines six key

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phases: (1) initial development, (2) growth and expansion, (3) specialization, (4) regional integration, (5) land constraints and decline, and (6) relocation and shift. This progression illustrates how ports evolve, impacting urban logistics, land use, and economic structures. Unlike static models, the port-city interface framework highlights continuous integration and disintegration, reflecting modern challenges such as land availability, environmental concerns, and shifting trade patterns.

Figure 2: Interpretation of Author Adapted from -Evolution model of the Port City Interface by Hoyle (1989); Schubert's Adaptation of Hoyle' Model with Proposed Sixth Phase (2011)

MODEL	CITY PORT MODEL				Period
	Phase	Stage	Symbol city port	Characteristics	
Hoyle Port Model Source: adapted from Hoyle et al. (1988)	1	Early port		Port and cities existed in close proximity and livelihood depend on port activity	Ancient-medieval to 19th century
	2	Growing port		Rapid commercial and industrial growth forces the port to expand beyond the city, with long docks and industries, while external interests develop the port and city for raw material exports and greater control	19th-early 20th century
	3	New City port		Industrial growth, especially oil refining, demands more space and separation. Trade expansion and the port's role as a hub lead to modern development through land reclamation.	Mid 20th century
	4	Moving from the Waterfront		New shipping technology leads to the creation of separate industrial zones, and export-focused policies bring in businesses with tax-free advantages.	1960-1980s
	5	Improving the Waterfront		Modern ports use a lot of land and water, which leads to renewing the old city center. The port's hub role increases productivity and puts pressure on space.	1970-1990s
Schubert's adaptation proposed 6 phase (2011)	6	Connecting Port and City		Changes in trade and transportation alter how ports and cities connect. Urban redevelopment helps them work better together. Rising costs in the hub lead to continued port activities and new construction, as well as growth into nearby areas.	1980-2000+

In contrast, (Figure 2) Hoyle's Port Model (1988) provides a historical perspective on the evolution of port-city relationships. It describes how ports were initially deeply integrated into city centers but gradually moved outward due to urban expansion, land constraints, and modernization. Schubert's adaptation (2011) refines this model by adding a phase that considers the reintegration of former port areas into urban planning, reflecting contemporary trends in waterfront redevelopment and mixed-use spaces. This theory provide an overview of the concepts associated with ports and port cities reveals a dynamic interplay among factors bearing upon their evolution. The relationship between ports and cities can be conceived through a series of models, represented in (Figure 2) to illustrate the cyclical nature of port-city development. The key concepts underpinning this evolution include the size of the port, its proximity to urban

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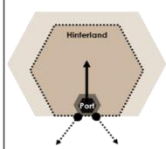
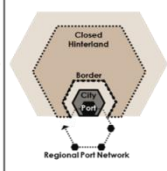
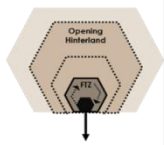
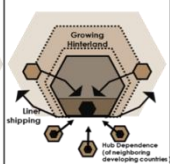
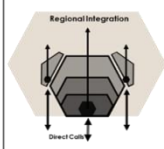
centers, and the surrounding environmental factors. As ports expand and modernize, the transformation also affects their urban landscape, resulting in increased demands for infrastructure and services in adjacent areas. However, this is not done linearly because it shows fluctuations where ports can enter a decline phase due to different challenges such as competition with other ports, degradation of the environment, and changes in trade routes (Yueyue ZHANG, 2018; Carola Hein, 2019).

Both models provide valuable insights into the evolution of port-city relationships. Hoyle's framework outlines a timeline of transformation, illustrating how ports shift over time due to urban expansion and modernization. On the other hand, Rodrigue's port-city interface model emphasizes the functional integration of ports within their urban and regional contexts, focusing on modern logistical structures and connectivity. Together, these perspectives offer a comprehensive understanding of port-city dynamics, aiding in the development of sustainable urban and port policies that balance economic growth, efficient connectivity, and urban development challenges.

Figure 3: Spatial Evolution of the Hub Port City

Time	Fishing coastal village	Colonial gateway	Entrepot city port	Free trade port city	Hub port city	Multi-hub gateway region
Global Factor	Settlement	Conquest, resource exploitation, export	Cargo consolidation, geopolitical control	Export-led policy, tax-free procedures, low labor cost, containerization.	Industrial shift to less-developed countries, financial and business hub, spatial division of labour	Increased globalization, port selection, supply chain strategies of shippers/carriers vertical & horizontal integration
Port City						
Local Factor	Small community of native practice self-sufficient trade	Rural exodus, harbour development, Western quarters	Trade increase, port expansion, demographic growth, industrialization	Modern port development through sea reclamation, manufacturing growth, suburbanization	Tertiarization, traffic concentration and congestion, transit trade from adjacent hinterland, waterside redevelopment	Port competition and cooperation, technological shift, cross-border cooperation, logistics development territorial pressure at CBD
Interface						

Source: Author's interpretation compiled from literature

Figure 3 presents a synthesis of the key mechanisms influencing the port-city interface across different stages of development. As a zone where port and urban growth intersect—both spatially and functionally—the interface undergoes continuous transformation. These changes are not only physical and aesthetic but also impact the functional dynamics of the area, reflecting shifts such as tertiarization and evolving economic activities.

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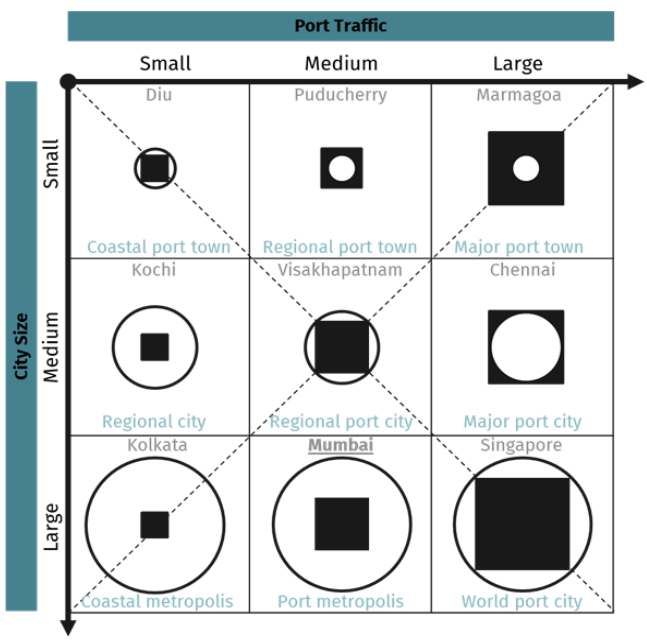
It shows the spatial development from small fishing villages to complex multi-hub gateway regions driven by global trade interactions at various levels and local factors. The initial role of ports was toward regional, self-sustaining communities, which then became gateways for resource extraction and export as part of colonialism, thus linking the hinterland with the colonizing metropole. Cities expanded industrially and ports turned into entrepôts, and regional trading networks morphed to become free-trade zones focused on export-led growth and containerization. Hub ports ultimately emerged as the global trade centres wherever-growing hinterlands merged with the shipping routes of the developing economies. Finally, with the gradual process of globalization, various multi-hub gateway regions emerged, characterized by regional integration, competition, and technological advancements linked into global supply chains and logistics networks (Lee, 2009). A synthesis proposed by Ducruet & Lee (2006) (Figure 4) illustrates that there are different types of port cities, varying based on port size and city size, ranging from coastal port towns to global port cities. which explains the relationship between ports and cities, building on the ideas of Fleming and Hayuth (1994). This matrix helps understand how ports and cities interact. It focuses on two key concepts: centrality, which refers to the city's importance and functions, and intermediacy, which describes the port's role in maritime trade and connections.

Figure 4: Matrix of Port-city Relations



Source: adapted from C. Ducruet (2003) "The Trans-Scalar Development of Transportation Hubs: A Quantitative Comparison of European and East Asian Container Port Cities in the 1990s".

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As shown in Table 3 Ports and cities evolve in different ways, leading to varied economic and spatial dynamics. The relationship between port size and urban growsth shapes the development patterns of a region, influencing trade, infrastructure, and employment. This classification highlights how different cities function within their maritime context, ranging from small coastal towns to major metropolitan hubs.

Table 3: Types of Port Cities: Based on Size of Port and Town.

Type of Port-City	Description
Coastal Port Town	Small towns with ports serving local economies.
Regional Port Town	Medium-sized towns with ports serving a broader regional trade network.
Major Port Town	Larger towns where the port plays a significant role in the local economy.
Regional City	Cities with diverse economic activities but smaller or no port functions.
Regional Port City	Cities where ports serve a regional trade network, but urban activities dominate.
Major Port City	Cities where the port is larger than the urban area and crucial for trade.
Coastal Metropolis	Large cities with secondary port functions, often focused on other industries.
Port Metropolis	Cities where urban activities are prominent, but ports remain significant.
World Port City	Global cities with large ports playing a major role in international trade.

Small cities and their ports: Small cities with small ports typically rely on fishing and local tourism. These towns have a limited population and economic activity, with ports mainly serving local needs. An example of this is Diu, a coastal island town where the port primarily supports fishing and tourism. However, in cases where a small city has a medium-sized port, the economic activity extends beyond local needs, facilitating small-scale trade. Puducherry represents such a case, where the port accommodates fishing activities along with some cargo transportation. In contrast, some small cities may have disproportionately large ports, making them significant trade hubs despite their limited urban population. Marmagao in Goa exemplifies this scenario, as it is a small town with a large port focused on iron ore exports.

Medium-sized cities and their port dynamics: Medium-sized cities exhibit more economic activity and infrastructure development, leading to a diverse range of port sizes. In cases where a medium city has a small port, the port primarily serves regional needs such as fishing, tourism, and small-scale trade. Kochi, for instance, has a small port that supports local fishing and coastal tourism but does not handle large cargo operations. When a medium city has a port that is proportionate in size, the port functions as an essential trade center for regional industries. Visakhapatnam, with its medium-sized port, plays a crucial role in cargo transportation and industrial trade. However, when a medium-sized city possesses a large port, it significantly influences economic development by facilitating major import and export activities. Chennai is an example of such a city, where its large port serves as one of the busiest maritime trade hubs in India.

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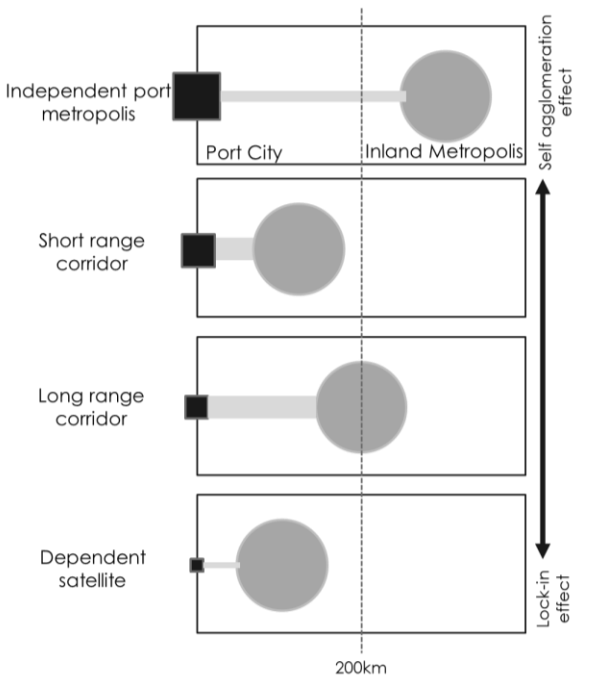
Large cities and their port roles: Larger cities with small ports often experience constraints due to geography or shifts in economic priorities. Despite having a significant urban population, these cities may not rely on their ports as primary economic drivers. Kolkata, for example, is a large city with a relatively small port, primarily handling riverine transport and inland cargo movement. When a large city has a medium-sized port, it plays an important role in regional and international trade but does not dominate global maritime logistics. Mumbai, one of India's largest cities, has a port that is crucial for trade yet not among the world's largest. Finally, in the case of a large city with a large port, both the urban and maritime sectors thrive, making the city a global economic powerhouse. While an Indian example is not as prominent, Singapore illustrates this category perfectly, where the port is central to the city's economy and global trade network.

Figure 5: Port-Town Relationships w.r.t. Distance



Sorce: Merk et al. 2011

While in international context: World port cities are large cities with major ports, such as New York, Hong Kong and Singapore. In port metropolises, the city is large, while the port, though significant, is smaller examples include Cape Town and Buenos Aires. When the port is even smaller within a large city, it is called a coastal metropolis, like Stockholm and Tunis. On the other hand, some cities have ports that are larger in comparison to their urban area. These are

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known as major port cities, such as Rotterdam and Genoa. Smaller cities with relatively large ports are called major port towns, like Freeport and Laem Chabang. This study focuses on port cities where either the city, the port, or both are significantly large or small (Merk, 2013). As the literature above explains the relationship between a port and its surrounding area, some cities may not have a port. In such cases, the concept discussed in the following paragraph becomes relevant.

Port-city relations based on distance: Even though some big cities don't have a port, they still rely on how well they are connected to one. Smaller ports that are closer to a major city often become part of that city's network. In such cases, they can act as dependent hubs or be linked through short or long transport routes (Figure 5).

The relationships between cities and ports can be categorized based on their functional and spatial linkages, forming different typologies of port-metropolis interactions.

Table 4: Cities with their Dependent Port Typology

Typology	Town	Port	Distance (Approx.) km
Dependent Satellites	Kolkata	Haldia	50
	Visakhapatnam	Duvvada	15
Short-Range Corridor Relationships	Mumbai	Jawaharlal Nehru Port	25
	Chennai	Kamarajar Port	24
Long-Range Corridor Relationships	Delhi	Mundra Port	1,100
	Bhopal	Kandla Port	900
Independent Metropolises	Kolkata	Paradip Port	400
	Hyderabad	Visakhapatnam	600
Landlocked Regions and Their Port Dependencies	Madhya Pradesh	Kandla/Mundra	900–1,200
	Rajasthan	Kandla/Mundra	700–1,100

Dependent satellites: Some metropolitan areas rely on smaller satellite ports that support their trade and shipping activities. These satellite ports reduce congestion at primary ports while ensuring smooth logistical operations. A prime example of this relationship is Kolkata and Haldia (Figure 1. Located approximately 50 kilometers from Kolkata, Haldia acts as a critical auxiliary port, handling a significant share of cargo traffic. By complementing Kolkata's extensive trade network, Haldia ensures that Kolkata's economic activities remain uninterrupted despite limitations at the city's primary port. Internationally, example could be Civitavecchia in its relation to Rome, and San Antonio in relation to Santiago.

Short-range corridor relationships: In some cases, major metropolitan, example closely linked to ports through well-developed transport corridors. These corridors enable efficient trade flows between cities and their primary maritime gateways. For instance, Mumbai and Jawaharlal Nehru Port (Nhava Sheva) form a highly integrated port-city system. Similarly, Chennai and

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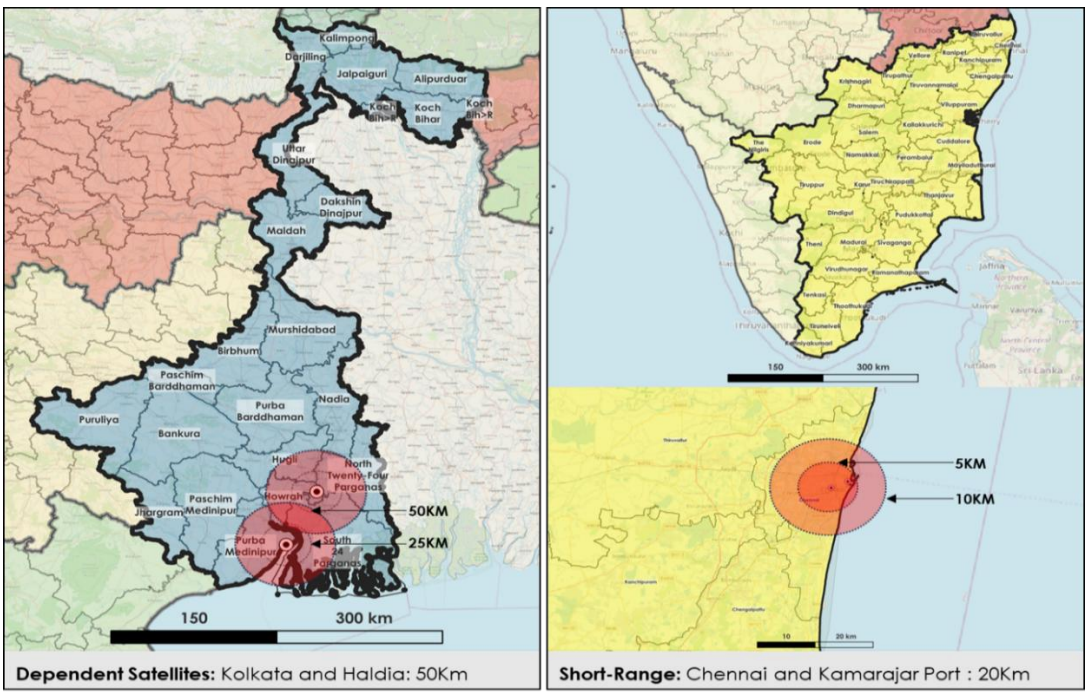
Kamarajar Port (Figure 6) exhibit a short-range corridor relationship. Internationally Santos-Sao Paulo, Port Klang-Kuala Lumpur and Incheon-Seoul shows similar relation.

Figure 6: Map Showing Various Corridor Relation w.r.t Port and City (Dependent Satellite and Short Range)



Long-Range Corridor Relationships: One of the most notable examples is Delhi and Mundra Port (Figure 7). Despite being over 1,000 kilometers apart, Mundra Port in Gujarat functions as Delhi's primary maritime outlet. The extensive road and rail network linking the two regions allows Delhi's industries to engage in international trade with efficiency. Similarly, Le Havre-Paris, Port Said-Cairo and Constantza-Budapest exemplify a long-range corridor relationship.

Landlocked regions and their port dependencies: Regions that lack direct coastal access must rely on multiple ports for their trade needs. Efficient transport networks ensure that these regions remain well-integrated with global supply chains. For example, Madhya Pradesh (Figure 7), a completely landlocked state, depends on ports in Gujarat, such as Kandla and Mundra, to facilitate trade. Rail and road connections play a crucial role in ensuring the smooth movement of goods to and from these ports.

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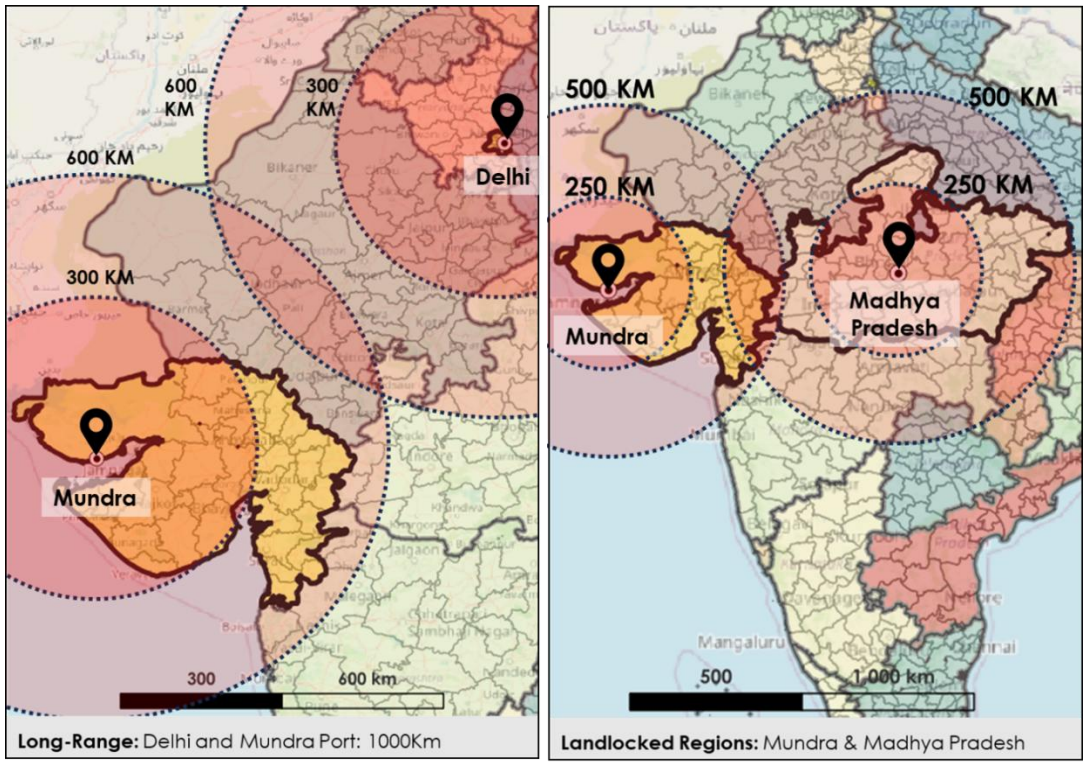
Figure 7: Map Showing Various Eorridor Relation w.r.t Port and City (Long Rand and Landlocked Region)



Independent metropolises: These cities develop their own economic bases while utilizing ports for external trade rather than direct dependency. A case in point is Kolkata and Paradip Port. Despite being the primary port for eastern India, Paradip functions independently from Kolkata, catering to industrial belts in Odisha and Jharkhand. This independence allows both Kolkata and Paradip to thrive without excessive reliance on each other.

4.0 Application of Port Development Models

It is observed that ports transform over time, a process that can be observed in India's maritime development. Derived from the framework of: Spatial evolution of the hub port city, India's ports have progressed from fishing villages (Kochi, Mumbai) to colonial gateways (Kolkata, Chennai), serving as trade hubs under British rule. As trade expanded, ports like Mumbai became entrepôt cities, managing regional commerce within closed hinterlands. Post-liberalization, JNPT and Mundra evolved into free trade port cities, integrating with global markets (JNPA, 2023).Today, ports like JNPT, Mundra, and Kandla are transitioning into a

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multi-hub gateway system, enhancing regional and international trade networks (Ducruet, 2006). Based on the various development models, examples of this pattern in India are highlighted in the table below.

Town	Port	Typology based on distance	Port Category (Based on Size & City Size)	Distance (Approx.) km
Kolkata	Haldia	Dependent Satellites	Regional Port City	50
Visakhapatnam	Duvvada		Regional Port Town	15
Mumbai	Jawaharlal Nehru Port	Short-Range Corridor Relationships	Port Metropolis	25
Chennai	Kamarajar Port		Major Port City	24
Delhi	Mundra Port	Long-Range Corridor Relationships	Major Port Town	1,100
Bhopal	Kandla Port		Major Port Town	900
Kolkata	Paradip Port	Independent Metropolises	Major Port Town	400
Hyderabad	Visakhapatnam		Major Port City	600
Madhya Pradesh	Kandla/Mundra	Landlocked Regions and Their Port Dependencies	Major Port Town	900–1,200
Rajasthan	Kandla/Mundra		Major Port Town	700–1,100

Application to Uran - JNPT port and surrounding: Uran has been taken as case to furher undertstand in detail. Mumbai's history pertaining to the port goes back to ancient times as it was an important trade center because it has been located on the western coast of India. The British East India Company seized this opportunity during the 17th century that led to the development of substantial infrastructure in the city. The Bombay Port Trust was established during the year 1873 (jnport, 2024). This expansion ensured the position of Mumbai as India's premier port, based on volumes that handle a large share of the country's cargo traffic.

However, with containerization picking up in the 1980s, the Mumbai Port could not cope, leading to extreme congestion and inefficiencies that spelt the need for more capacity. In response to such an event, JNPT, more popularly known as Nhava Sheva, was established in 1989 with the objective of decongesting Mumbai Port and also catering to increasing container volumes. Strategically situated near the Greater Mumbai Area, JNPT has emerged as India's largest container port and currently handled nearly 5.1 million TEUs during the period of 2020-2021, this we can relate with: Typologies of port cities. Additionally, Vadhvan Port is being developed as a satellite port to support Jawaharlal Nehru Port (JNPT).

The port supported connectivity through major road and rail networks and greatly contributed to the country economy as it created about 100,000 jobs while enabling exports and imports. Observations at JNPT port reflect the theory of: Spatial Evolution of the Hub Port City by Lee & Ducruet (2009), which examines the relationship between port development and urban growth. At present, JNPT deals with about 33 percent of all container traffic in India, thus underlining its importance to the trade and economic development of the growth (AECOM, 2016; Aman Rathi, December 2020).

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Figure 8: Map of Uran

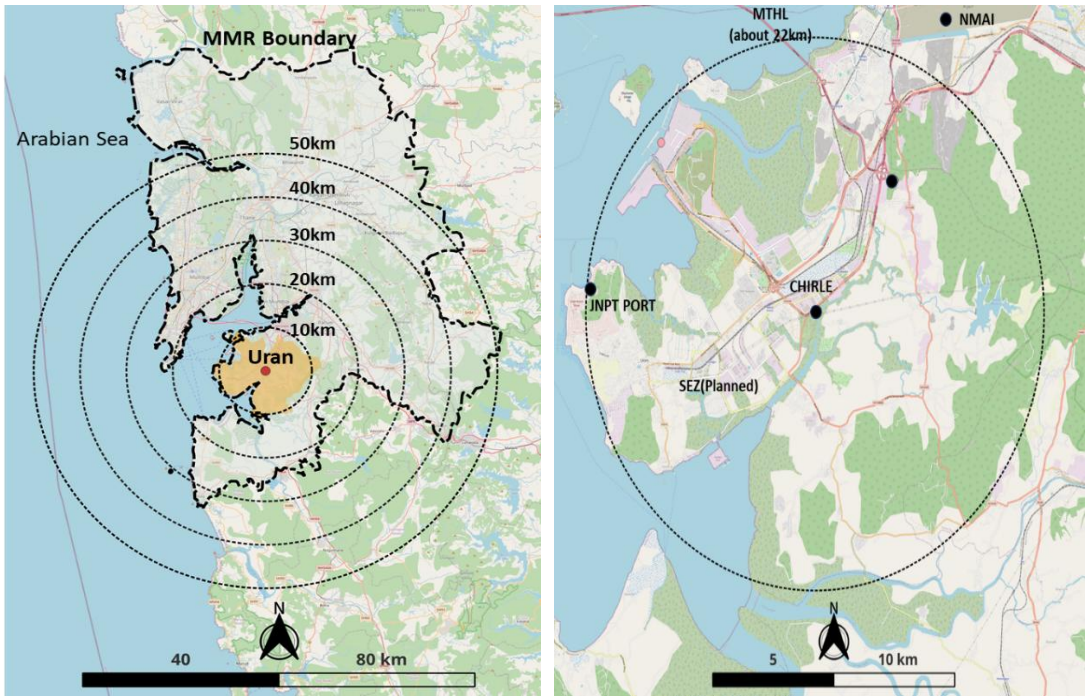
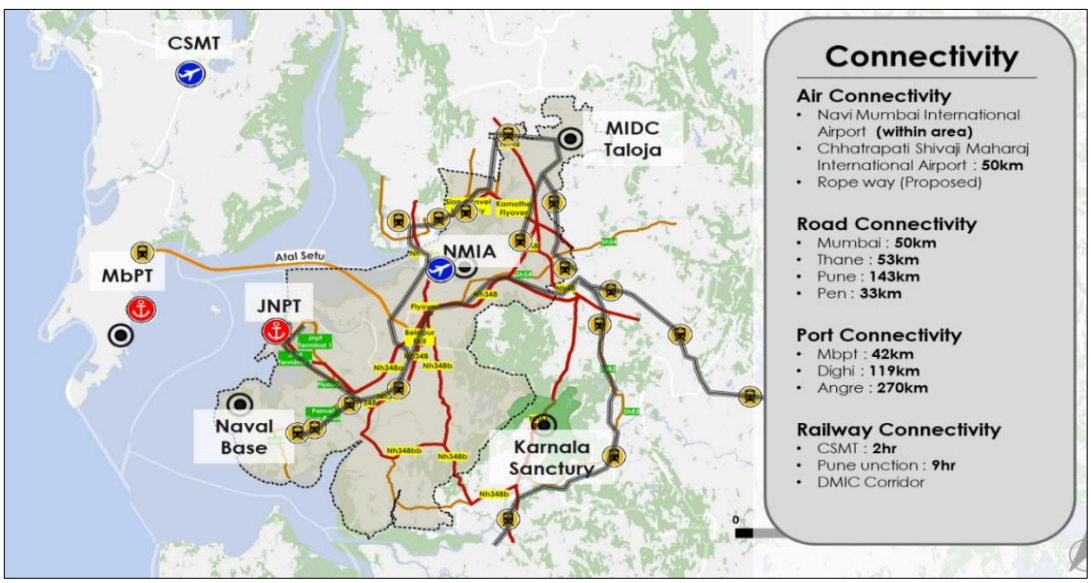


Figure 9: Map with Connectivity and Major Projects around of Uran



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5.0 Conclusion

In conclusion, several key parameters drive port-led development, leading to the evolution of ports over time. Amongst them are strategic location, connectivity to transport networks, and land: port: city relation start to evolve with changed land use patterns. There is no single way in which port-city relationships evolve. The patterns of port-city separation seen in European port cities apply in many cases worldwide, but not all. Some highly developed port cities have experienced a decline in port activity, but many have successfully adapted through good planning and strategic location advantages. However, creating a new model for port-city relationships is challenging because each city's growth is shaped by a mix of local and regional factors influenced by globalization. Observations in Uran reveal that something similar is happening there too; the closeness to Mumbai and the necessity of upgrading the port facilities reflects a huge scope for port-led development. By capitalizing on its strategic location through infrastructure enhancement, land-use optimization, and fostering institutional cooperation, Uran has all the potential to turn into a vital maritime hub. These factors will consider the historical context, environmental quality, urban growth and activity concentration, and stakeholder interests-similarly essential not only for supporting regional economic activities but also in service of India's overall trade objectives.

References

AECOM. (2016). *Master plan for Jawaharlal Nehru Port Trust*. AECOM.

Banga, I. (1992). Ports and their hinterlands in India 1700–1950. *JSTOR*. https://www.jstor.org/stable/2760708

Basu, D. (1985). *The rise and growth of the colonial port cities in Asia*. University Press of America.

Broeze, F. (1989). *Brides of the sea: Port cities of Asia from the 16th–20th centuries*. University of Hawaii Press.

Bryan, J., & Jones, C. (2006). Assessing the economic significance of port activity: Evidence from ABP operations in industrial South Wales. https://www.researchgate.net/publication/248989233

Hein, C., & van Mil, Y. (2019). Towards a comparative spatial analysis for port city regions based on historical geo-spatial mapping. *RETE*.

Ducruet, C., & Merk, O. (2023). Ports and their influence on local air pollution and public health: A global analysis. *Science of the Total Environment*.

DOI: 10.17492/JPI/NICMAR/2507105 *ISBN: 978-93-49790-54-4*

Driessen, H. (2005). Mediterranean port cities: Cosmopolitanism reconsidered. *History and Anthropology*.

Ducruet, C., & Lee, S.-W. (2006). Frontline soldiers of globalization: Port–city evolution and regional competition. *GeoJournal*.

Ducruet, C. (2011). The port city in multidisciplinary analysis. In *The port city in the XXI century: New challenges in the relationship between port and city* (RETE).

Fawaz, L. T. (2002). *Modernity and culture: From the Mediterranean to the Indian Ocean*. Columbia University Press.

Hall, P. V. (2007). Seaports, urban sustainability, and paradigm shift. *Journal of Urban Technology, 14*(2), 87–101.

Hayuth, Y., & Hilling, D. (2000). The role of ports in urban development: The case of Haifa Port. *Environment and Planning A*.

Hoyle, B. S. (n.d.). The port-city interface: Trends, problems, and examples. *Geoforum*. https://www.sciencedirect.com/science/article/abs/pii/0016718589900262

Jacobs, W., & Hall, P. V. (2007). What conditions supply chain ports? The role of infrastructure and governance in port regionalization. *GeoJournal*.

Kaselimi, E., & Notteboom, T. (2011). The impact of the economic crisis on the dynamics of the port labour market: The case of the Greek port industry. *Research in Transportation Business & Management*.

Lonza, L., & Cazzola, M. (2016). Ports as drivers of urban and regional growth. *Transportation Research Procedia, 14*, 2507–2516. https://doi.org/10.1016/j.trpro.2016.0 5.327

CIDCO & Consultants Pvt. Ltd. (2017). *Draft development plan for Navi Mumbai Airport Influence Notified Area (NAINA)*. Government of Maharashtra.

Merk, O. (2013). *The competitiveness of global port-cities: Synthesis report*. OECD Regional Development Working Papers.

Nas, P. J. M. (2004). Port cities. In C. Beng-Huat & A. Graf (Eds.), *IIAS Newsletter* (Issue 37). https://www.iias.asia/sites/default/files/2020-11/IIAS_NL37_32.pdf

Ng, A. K. Y. (2010). Port governance reforms in diversified institutional frameworks: Generic solutions, implementation asymmetries. *Environment and Planning A*.

DOI: 10.17492/JPI/NICMAR/2507105 *ISBN: 978-93-49790-54-4*

Notteboom, T., & Rodrigue, J.-P. (2001). Structural changes in logistics: How will port authorities face the challenge? *Maritime Policy & Management*.

Notteboom, T., & Rodrigue, J.-P. (2005). *Port regionalization: A global perspective*. Routledge.

Notteboom, T., Pallis, A. A., & Rodrigue, J.-P. (2022). *Port economics, management and policy*. Routledge.

Rodrigue, J.-P., & Notteboom, T. (2011). The port city interface and maritime logistics. In W. K. Talley (Ed.), *The Blackwell Companion to Maritime Economics*. Blackwell.

Lee, S.-W., & Ducruet, C. (2009). Spatial glocalization in Asia-Pacific hub port cities: A comparison of Hong Kong and Singapore. *Urban Geography*.

Mitra, S., & Hiremath, R. (2016). *Scaling new heights: Vizag-Chennai Industrial Corridor – India's first coastal corridor*. Asian Development Bank. https://www.adb.org/sites/default/files/publication/183392/scaling-new-heights-ind.pdf

Shinde, S. (2023). JNPT Port: India's gateway to global trade. *Medium*. https://shindesuraj651sns.medium.com/jnpt-port-indias-gateway-to-global-trade-edcbdb5b3645

Wang, J. J. (2000). The evolution of a regional container port system: The Pearl River Delta. *Journal of Transport Geography*.

Zhang, Y., & Monios, J. (2018). Next generation of the port-city interface: The future lies in the past. In *AIVP Conference Proceedings*, Canada.

Zhuang, X., & Wang, L. (2022). Port planning and sustainable development based on prediction modelling of port throughput: A case study of the deep-water Dongjiakou Port. *Sustainability, 14*(7), 4276. https://doi.org/10.3390/su14074276

Swamy, H. M. S., & Patel, G. (2010, July–September). Planning the city around the port: Maximizing synergies and minimizing conflicts. *Institute of Town Planners, India Journal, 7*(3).

Rathi, A., & Patel, A. P. (2020, December). *Enhancing port performance: A case of Jawaharlal Nehru Port Trust* (IIMA Working Paper). Indian Institute of Management Ahmedabad. https://www.iima.ac.in/sites/default/files/rnpfiles/17904292902020-12-04.pdf

JNPT. (2024, October). *History*. https://www.jnport.gov.in/page/history/dGxXZFVwR3U5ZGRqQWVHazVPajZ6QT09

DOI: 10.17492/JPI/NICMAR/2507105 *ISBN: 978-93-49790-54-4*