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Thesis

**GATEWAY PORT PROFILES AND SUPPLY
CHAIN COMPETITIVENESS:
THE CASE OF THE AUSTRALIAN PORTS**

Postgraduate Student

Ferdoutsis Maria Eleni

Supervisor

Dr. Boile Maria - Poulia

Piraeus

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The members of the Committee were:

- MEMBER A': (Supervisor) Dr. Maria Poulia Boile
- MEMBER B': Dr. Galanis Georgios
- MEMBER C': Dr. Ioannis N. Lagoudis

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Abstract

This thesis explores the relationship between gateway port profiles and supply chain competitiveness, focusing on major Australian ports such as Sydney, Melbourne, Brisbane, and Perth. It examines how port infrastructure, operational efficiency, shipping route mapping, and hinterland connectivity affect Australia's import/export performance and logistics capabilities. The study applies Logistics Performance Index (LPI) criteria to evaluate trade efficiency and identify areas for improvement in port management and policy.

Beyond the Australian context, the research expands to selected African ports, where challenges such as poor infrastructure, limited connectivity, and political tensions hinder trade performance. Recent Chinese investments in African port infrastructure are assessed in terms of their strategic role in boosting regional logistics and supply chain development. The case of landlocked countries, like Kazakhstan, is also discussed to highlight the importance of corridor development and intermodal connectivity in integrating remote economies into global trade networks.

Using a mixed-methods approach, the thesis combines secondary data analysis, port case studies, and benchmarking tools to develop a comprehensive understanding of how port development impacts national and regional competitiveness. The findings aim to support more strategic, data-driven decisions in port logistics, trade facilitation, and infrastructure investment.

Key words: Gateway port profiles, Supply chain, Logistics, Australia, Africa, Kazakhstan, Competitiveness, Policy makers, Strategies, Global Challenges

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List of Abbreviations

ADB – Asian Development Bank

BRI – Belt and Road Initiative

CSIS – Center for Strategic and International Studies

EY – Ernst & Young

GDP – Gross Domestic Product

LPI – Logistics Performance Index

OECD – Organisation for Economic Co-operation and Development

PoM – Port of Melbourne

TEU – Twenty-foot Equivalent Unit

TITR – Trans-Caspian International Transport Route

UNCTAD – United Nations Conference on Trade and Development

WB – World Bank

Introduction

Within global supply chains, ports serve a dual function: they facilitate the transfer of goods between sea and land and at the same time as strategic assets they shape the competitiveness of both regional and national trade systems. As global production systems become more fragmented and logistics practices increasingly rely on just-in-time delivery and geopolitical uncertainty, the performance of gateway ports plays a key role in determining countries' ability to participate in global trade networks. Port efficiency and connectivity, together with governance structures and institutional capacity have moved beyond their traditional role as technical considerations, becoming instead fundamental in supporting reliable supply chains, efficient trade processes and economic stability.

Even though port competitiveness and logistics performance have been widely examined in the literature, their interpretation varies across contexts, reflecting the multidimensional nature of the concept. Previous researches (Van de Voorde & Winkelmanns, 2002; Notteboom & Rodrigue, 2005) suggest that port competitiveness cannot be explained solely by infrastructure capacity or cargo throughput but rather results from the combined influence of institutional effectiveness, geographical conditions, governance arrangements and the wider logistics environment surrounding ports. From this perspective, geography strongly influences the conditions under which ports and logistics systems operate. Island economies depend almost exclusively on maritime gateways for their economic survival, coastal economies use ports as engines of regional trade integration, while landlocked economies face structural disadvantages that necessitate alternative logistics strategies beyond conventional seaports.

Building on this framework, this thesis adopts a comparative case study approach to examine how different geographical settings – island, coastal and landlocked – affect port and logistics competitiveness. Australia, Nigeria and Kazakhstan are selected as case studies, as they represent those three abovementioned geographical typologies. Australia serves as an example of an island economy, where strong governance frameworks and institutional capacity support a highly developed port system. Nigeria illustrates the case of a coastal developing economy in which ports play a vital role in supporting national and regional trade. However, port performance continues to face persistent challenges related to congestion, institutional constraints and infrastructural gaps. As a landlocked country, Kazakhstan demonstrates that

competitiveness depends primarily on the effectiveness of inland corridors, international logistics and cross border cooperation rather than by seaport infrastructure.

Beyond geographical and institutional factors, the study takes into consideration the influence of foreign investment on port and logistics performance, with a specific emphasis on Chinese-led infrastructure development. Over the last two decades, China has become a prominent actor in the construction, financing and operation of ports worldwide, particularly across developing countries. Although such investments can contribute to improved connectivity, technological upgrading and increased capacity, their impact on competitiveness varies considerably, as it is shaped by domestic institutional arrangements, regulatory frameworks and national policy priorities. Through a comparison of countries with different governance capacities and exposure to foreign capital, the study examines whether infrastructure-led strategies are sufficient to enhance logistics performance, or whether institutional and policy factors are equally important.

From a methodological perspective, a qualitative approach is adopted, integrating secondary data analysis with port and corridor case studies, and benchmarking tools such as World Bank's Logistics Performance Index. This approach enables a systematic analysis of the interactions between geography, governance and external investment across different national settings, moving beyond the assessment of isolated performance indicators. This analysis seeks to move beyond single-country perspectives and offers an integrated framework for understanding port and logistics competitiveness across diverse structural contexts.

The structure of this thesis is outlined below. Chapter 1 reviews the relevant literature on port competitiveness and presents the methodological framework adapted in the study. In Chapter 2, Australia is examined as an island economy, with emphasis on its major gateway ports, shipping routes and hinterland connectivity. In Chapter 3, the Nigerian port system is analysed as a coastal case, focusing on operational constraints and the influence of foreign investment, particularly of China, on port development. Chapter 4 examines Kazakhstan as a landlocked case, highlighting logistics constraints and the strategic role of multimodal transport corridors. Finally, Chapter 5 synthesizes the comparative findings of the study, providing a structured comparison of the three cases, leading to policy-relevant conclusions of port and logistics competitiveness.

Chapter 1. Literature Review & Methodology

1.1 Literature Review

Academic studies consistently highlight the absence of a unified definition of port competitiveness, given the complexity and multiplicity of factors involved. For this reason, Van de Voorde and Winkelmas (2002) observed that the concept may be examined from multiple viewpoints, while Verhoeff (1981) was among the first to analyse seaport competition in a structured way. Despite dating back to the 1980s, he also recognised the multifaceted character of port competition. According to him (pp 49), seaport competition is often discussed but infrequently analysed in detail. Seaport competition is inherently complex, making it inappropriate to speak of a single definitive form of “the” competition. Identifying and classifying its competitiveness requires considerable care and precision. Verhoeff argues that the complexity arises from the different geographical levels, the economic configurations of port areas, and the characteristics of the port service market. Despite his contribution to the field, the author himself does not seek to provide an exact definition of seaport competition. Conversely, his conceptual framework places seaport competition within a framework of three geographical levels: those among port areas, port areas within a given range, and ports within a port area.

In general terms, port competitiveness is recognized as “competition between and within ports”, nevertheless, scholars agree that this definition has become unsuitable (Haezendonck, 2001) and in many respects, incomplete (Van de Voorde and Winkelmas, 2002). According to Van de Voorde and Winkelmas (2002), port competitiveness should be defined in a way that reflects all its practical components, including the traffic structure of ports and their operators, management systems, port authority expertise, the application of communication and technological tools, governmental interventions, and the creation of added value. Taking these factors into account, they propose the following definition (p.11):

“Seaport competition refers to the competition between port undertakings, or as a case may be terminal operators (...) in relation to specific transactions (the object, taking into account the origin and destination of the traffic flows concerned). Each operator is driven by the objective to achieve maximum growth in relation to goods handling, in terms of value added or otherwise. Port competition is influenced by (1) specific demand from customers, (2) specific factors of production, (3) supporting industries connected with each operator, and (4) the

specific competencies of each operator and rivals. Finally, port competition is also affected by port authorities and other public bodies”.

As stated by Notteboom, Rodrique and Pallis (2005), port competitiveness refers to the capability to attract shipping lines and cargo while providing efficient, cost-effective, reliable and dependable services. Through cost-efficient, reliable and frequent access to both international and inland markets, seaport plays a vital role in supporting trade and strengthening national or regional competitiveness. This strategic value is expressed in different ways. Firstly, the presence of efficient seaports can significantly influence where firms choose to locate. Secondly, the presence of an efficient port network can reduce reliance on international ports and minimize total logistic expenses for regional business. Thirdly, ports play a key role in boosting the global competitiveness of regional or national firms, mainly by leveraging innovation and sophisticated business and management networks.¹

High quality infrastructure and enhanced connectivity are becoming essential conditions for achieving competitiveness. For high-income economies, innovation and advanced production factors become essential to remain competitive. As a result, this changes the strategic role of the ports. Rather than solely facilitating market connectivity, ports increasingly serve as hubs for innovation. Ports are no longer simply confined to quayside zones for the handling of the cargo between land and sea. It now serves as a crucial link within global supply chains and international transport networks. Through efforts to enhance efficiency and competitiveness, ports may become engines of innovation, a process supported by port cluster management which promotes the exchange of knowledge among organizations inside and outside the cluster. Clusters facilitate the transfer of knowledge, fostering innovation and contributing to greater added value. Via the concentration of major multinational enterprises, key firms, and industry clusters, ports can become sources of innovation, enhanced productivity and strategic partnerships. Ports may strengthen specialization, innovation, and productivity development by collaborative networks with nearby ports and logistics hubs. Finally, they contribute to the diffusion of skills and the ongoing enhancement of knowledge in the fields of port management and logistics. Alongside economic factors, a broad approach encompassing these strategic elements is essential for evaluating port development plans (Notteboom, Rodrique & Pallis, 2005).

¹ https://porteconomicsmanagement.org/wp-content/uploads/10.4324_9780429318184_previewpdf.pdf

1.2 Methodological approach

This study adopts a qualitative approach as Creswell describes it (2014) in order to explore the ways, the influence of geography, institutional capacity and external influence shape port and logistics competitiveness across different national contexts. This approach is selected between others because it seems more appropriate for approaching the research questions below, as it is focused on understanding structural and institutional differences, rather than establishing statistical relationships.

The comparison of the contrasting cases of Australia as an island state, Nigeria as a coastal developing country and Kazakhstan as a landlocked country, enables a systematic examination of similarities and differences between them, shaping outcomes of how geography, institutional conditions and foreign investments, affect port and logistics competitiveness.

1.2.1 Case selection

This thesis is an attempt to address these gaps by providing a comparative analysis of Australia, Nigeria and Kazakhstan, three countries that represent distinct geographical and institutional statuses in global trade. By integrating insights on port competitiveness theory, logistics performance indicators and foreign investment dynamics (with emphasis on Chinese involvement), a holistic perspective will be given on how logistics competitiveness can be shaped through different paths. Accordingly, the study addresses the following research questions:

1. To what extent do geographical conditions shape port and logistics competitiveness across different national contexts?
2. How and to what extent can internal investment – especially Chinese-led infrastructure development – improve logistics performance across countries with varying institutional capacities?
3. Are infrastructure-led strategies solely sufficient for improving competitiveness, or do governance and institutional reforms play a role in this?

1.2.2 Data Sources & Limitations

The literature on port competitiveness, logistics performance and infrastructure development is extensive (Notteboom & Rodrigue, 2005; Tongzon, 2007; UNCTAD, 2022; World Bank, 2023), however, studies tend to concentrate either on individual country cases, or on isolated dimensions such as port efficiency, governance and connectivity. Cross-country approaches that integrate different geographical contexts (f.i. island states, coastal developing economies and landlocked states), and the role of external actors in shaping logistics outcomes remain limited. For example, Rodrigue et al. (2017) are examining global supply chains but with no comparisons in the factor of geopolitical status, Notteboom et al. (2005), refer to ports and hinterland but not in the differences between landlocked states and island nations. Also, World Bank LPI reports (2022,2023) are indicator-based, and they do not have any institutional comparisons, UNCTAD studies about corridors do not compare governances and policies, and Cullilane (2018) writes only about Chinese investments solely, not having any cross-typologies in his study. Consequently, the interaction between geography, institutions and foreign involvements remains insufficiently examined within a comparative analytical framework. The following chapters provide the relevant literature and methodological foundations necessary to address the abovementioned research questions.

Chapter 2. Australia – Island Maritime Competitiveness

The island nation of Australia, overly depended on international trade, houses several gateway ports, crucial for its financial performance and global connectivity. The country's most strategic ports are Port Botany (Sydney), Melbourne, Brisbane, and Fremantle (Perth). Those four ports operate as pivotal nodes in the supply chain worldwide, each possessing distinct infrastructure, capacities and commercial specializations.²

- Port of Melbourne

This one is the largest container and cargo port of Australia. It is situated at the mouth of Yarra River and it performs as a hub for both international and domestic trade. It handles approximately 3 million TEUs annually, and that's because of its strategic location. Port of Melbourne makes a vital connection between the two major global markets of Asia and America. It supports large vessels due to its deep-water berths and supports high-volume container traffic and also is equipped with modern cranes, storage facilities, automated terminals, on-dock rail access and generally advanced logistics infrastructure, ensuring well organized and methodical cargo handling. Regarding the container terminal, a large amount of Melbourne port imports includes machinery, electronics and vehicles. In the financial year 2023-2024, container trade grew with a 1,9 increase in total throughput to 3,26 million TEUs. In March 2025, the average container exchange rate was 1,852.000 containers. Compared to the prior figure of 1,832.000 containers for February 2025 this represents an increase. (*Source: Port of Melbourne Trade Statistics, 2023*)

- Port of Botany (Sydney)

Port of Botany (Sydney) is a major hub for containerized trade on the east coast of Australia. Its proximity to industrial zones and robust rail links makes it essential for New South Wales's economy. This port has undergone significant upgrades, including new quay cranes and expanded intermodal terminals, aiming to improve rail modal share to 40% by 2040. Port Botany (Sydney) primarily supports containerized trade, with strong import flows of consumer goods, food, and chemicals. Export volumes are comparatively lower, consisting mainly of agricultural and industrial products. Its advanced logistics zones and proximity to

² <https://www.infrastructure.gov.au/infrastructure-transport-vehicles/freight/ports>

population centers give it a strong import-handling profile. (Source: *NSW Ports Trade and Supply Chain Strategy 2023, NSW Ports Sustainability Report, 2023*)

- **Port of Brisbane**

Port of Brisbane focuses on containerized, bulk, and motor vehicle trade. It has experienced major growth over the last few years, such as deepening its shipping channels, improving port accessibility and digitalization of operations. Brisbane port has invested heavily in dredging and automation to accommodate larger vessels and reduce congestion. (Port of Brisbane Corporation, *Strategic Plan 2022–2027*) Port of Brisbane plays a dual role, manages large quantities of both exports and imports. The port primarily exports coal, grains and meat, and handles incoming goods such as motor spares and vehicles and fuels. Its trade is strongly connected to Queensland’s resource-focused economy. (Port of Brisbane Annual Report 2023)

- **Port of Fremantle (Perth)**

Fremantle Port (Perth) operates as key port of the West Australia. It is a central export point for minerals and agricultural products. Although handling less volume compared to Melbourne or Sydney, it connects distant industries to global markets. Also provides affective intermodal integration. (Fremantle Ports Annual Trade Report, 2023) Fremantle Port (Perth) supports Western Australia’s mineral and agricultural exports. Its trade profile is leaned toward bulk commodities, including iron ore and wheat. Container volumes are lower than those of the eastern ports, but this does not change the fact that Fremantle Port is crucial for regional export flows. (Source: *Fremantle Ports Trade Report 2023*)

2.1. Import – Export performance

In general, those 4 key ports operate under a **resource-export/import-consumer model**. Which means that most high-value exports flow via bulk-specialized terminals and imports are mainly handled by container terminals, specifically on the east coast. In the charts above, there is a comparison which highlights the trade dynamics and operational roles of each major Australian gateway. It appears that Sydney and Melbourne function primarily as import hubs. This fact reflects their strategic value regarding industrial inputs and containerized retail

products. In the contrary, Fremantle and Brisbane ports demonstrate greater export performance, due to their roles in bulk export trade (mainly in coal, agriculture and minerals).³

Indicatively, the following table presents last year’s (2022-2023) data:

Table 1 Imports vs Exports Volumes by Major Australian Ports

Port	Exports	Imports	Notes
Port of Melbourne	49.4 million tones	62.5 million tones	Imports dominate over exports – PoM is a primarily import hub
Port of Sydney	421k TEUs	1233 million TEUs	Imports dominate (containerized goods)
Port of Brisbane	19.17 million tones	12.12 million tones	Imports dominate but exports remain significant
Port of Fremantle	No data	No data	Total trade 31.2 million tones (bulk) – smaller import volumes

(Sources: Port of Melbourne, 2023; NSW Ports, 2023; Port of Brisbane, 2023; Fremantle Ports, 2023; Australian Bureau of Statistics, 2023)

2.1.1 Shipping Routes and Hinterland Connectivity in Australia

A port’s strategic performance and its contribution to global and national supply chains are strongly depended on the quality of its shipping routes and connectivity. (Notteboom & Rodrique, 2005; UNCTAD, 2023) Well integrated ports, supported by efficient hinterland transport systems, enhance their ability to attract cargo and logistic operations, improving overall port competitiveness. (De Langen, 2007)

Due to its geographical isolation from major global markets, maritime connectivity is truly vital for Australia’s economic performance. (Infrastructure Australia, 2021) Given its

³

- 1) <https://www.portofmelbourne.com/wp-content/uploads/Port-of-Melbourne-Trade-Report-Jun-2023.pdf>
- 2) <https://www.portbris.com.au/documents/d/port-of-brisbane/port-of-brisbane-fy23-sustainability-report-pdf-1>
- 3) [https://www.parliament.wa.gov.au/publications/taledpapers.nsf/displaypaper/4112265a1a268430b869c6d248258a300017b1ea/\\$file/tp+2265+\(2023\)+fremantle+ports+2022-2023+annual+report.pdf#:~:text=The%20Port%20of%20Fremantle%20handles%20more%20than,bert h%20two%20large%20passenger%20ships%20at%20once.](https://www.parliament.wa.gov.au/publications/taledpapers.nsf/displaypaper/4112265a1a268430b869c6d248258a300017b1ea/$file/tp+2265+(2023)+fremantle+ports+2022-2023+annual+report.pdf#:~:text=The%20Port%20of%20Fremantle%20handles%20more%20than,bert h%20two%20large%20passenger%20ships%20at%20once.)
- 4) https://www.portauthoritynsw.com.au/sites/default/files/2025-03/port-authority_ar23_final.pdf

status as an island continent, Australia depends on a strong shipping route network to improve its import and export activities. Consequently, Australian ports not only function as a gateways for goods, but also as critical nodes, linking the country to global chains across the international markets of Asia, Europe and America. (Rodrigue et. Al, 2020)

Figure 1 The trade routes vital Australia's economic security



1. To Europe via the Suez Canal, passing Malacca Strait
2. To India across the Great Australian Bight and Indian Ocean
3. Coal ships for India that are too large for the Torres Strait
4. LNG / iron ore to China, Taiwan and Korea through Makassar Strait and the South China Sea
5. Similar route to Japan, keeping east of Sulawesi and Philippines
6. To Southeast Asia and Hong Kong through the Torres Strait and past Irian Jaya
7. Main route between China and eastern Australia through Vitiavz Strait between PNG and New Britain
8. Route from eastern Australia to Japan, east of New Britain
9. To the US west coast
10. To New Zealand and the Panama Canal

(Source: <https://www.aspi.org.au/report>)

The country is highly integrated into east-west trade corridors, with the Asia Pacific route playing a dominant role. (OECD, 2019) Australian ports maintain frequent connections with China, Japan, South Korea, and Southeast Asian economies, reflecting the predominance of Asia in Australia's trade. (Department of Infrastructure, Transport, Regional Development and Communications, 2022) These shipping corridors accommodate significant containerized import flows, manufactured goods, as well as intermediate inputs, while enabling exports of agriculture, raw materials and energy products. (UNCTAD, 2023)

Within the Australian maritime network, Ports of Melbourne and Sydney act as principal gateways for containerized imports from Asia. (Infrastructure Australia, 2021) the combination of large consumer markets, modern terminal facilities and well-established intermodal networks, enable these ports to proceed with high container volumes affectively. (Notteboom, 2010) Particularly, Melbourne has become Australia's leading container port, supported by robust rail and road connections linking industrial and consumer markets within Victoria and across broader networks. (Port of Melbourne, 2022)

By contrast, ports of Brisbane and Fremantle are more focused on handling export trade. (OECD, 2019) Fremantle links Australia to markets of South Asia, Middle East and Africa (Indian Ocean region), while Brisbane facilitates trade with Pacific Island and key Asian markets. (Department of Infrastructure, Transport, Regional Development and Communications, 2022) By handling bulk commodities, agricultural products and containerized cargo, these ports reinforce Australia's role into regional and international supply chains. (Rodrigue et al., 2020)

The effectiveness of hinterland connectivity further enhances the strategic function of Australian ports. (De Langen & Chouly, 2004) Well-developed Road and rail infrastructure links key ports to production zones, mining regions and urban centers, lowering transport costs and enhancing reliability. (Infrastructure Australia, 2021) Investments to intermodal terminals, rail corridors, and digital logistics systems have enabled Australian ports to serve as integrated nodes connecting maritime operations with inland transport, facilitating time-sensitive and high value trade flows. (OECD, 2019)

Overall, through efficient shipping routes and hinterland connectivity, competitiveness of Australian ports ensures dependable access to international markets, support export-driven growth and strengthen supply chain resilience. (Notteboom & Rodrigue, 2005) Combining extensive maritime integration with advanced inland transport make Australian ports efficient and strategically import hubs in the Asia-Pacific trade network (Rodrigue et al., 2020)

These 4 major ports of Australia, vary as it comes to infrastructure, hinterland connectivity and efficiency, three factors affecting their World Bank Logistics Performance Index (LPI) scores and so on the country's competitiveness. The latest available LPI scores for Australia place it in the 19th place between 139 countries.

Table 2 World ranking on top 20 logistics performers

	Countries	LPI score 2023		Countries	LPI score 2023
1	Singapore	4.3	11	Sweden	4.0
2	Finland	4.2	12	UAE	4.0
3	Denmark	4.1	13	France	3.9
4	Germany	4.1	14	Japan	3.9
5	Netherlands	4.1	15	Spain	3.9
6	Switzerland	4.1	16	Taiwan, China	3.9
7	Austria	4.0	17	South Korea	3.8
8	Belgium	4.0	18	US	3.8
9	Canada	4.0	19	Australia	3.7
10	Hong Kong	4.0	20	China	3.7

(Source: <https://www.cerl.fr/en/logistics-performance-index-of-the-world-bank-europe-in-the-lead>)

According to the World Bank’s Logistics Performance Index (2023), Australia’s LPI score is 3.7 (1=lowest, 5=highest). Due to Australia’s strong quality of physical logistics infrastructure (roads, rail, ports), the score for “Quality of trade and transport related infrastructure” is around 4.1. Despite this fact and because of Australia’s weakness on other logistics dimensions (e.g. “tracking and tracing”, “Ease of arranging shipments”, “timeliness” etc.), score is reporting around 3.1.⁴ From this analysis, it can be inferred that Australia maintains a robust and strategically advantageous logistics system, including key ports and transportation networks, benefiting principal gateway ports and primary trade corridors. Yet, improvements in certain logistics aspects, such as customs clearance, shipment preparation, tracking and tracing, IT and timeliness, could elevate country’s performance.

For the four major ports under analysis (Melbourne, Sydney, Brisbane, Fremantle), the operational environment is strong, however, issues persist in terms of flexibility, efficiency and service quality. Strategically, these ports are well equipped to handle large trade flows (especially bulk exports and containerized imports), but achieving higher national competitiveness, efficiency and ranking require improvement in non-infrastructure areas.

2.2 Limitations and trade offs of the Australian Port System

Although Australia’s port system is characterized by high levels of efficiency and strong institutional stability, these strengths are accompanied by notable structural tradeoffs. High labour costs, strict regulations, environmental requirements and safety standards, increase

⁴ <https://www.ceicdata.com/en/australia/transportation/au-logistics-performance-index-1low-to-5high-quality-of-trade-and-transportrelated-infrastructure>

operating expenses for both port operators and shipping lines. As a result, despite strong performance and service quality, Australian ports achieve competitiveness primarily in terms of reliability, service quality and governance effectiveness, rather than cost minimalization. (Notteboom & Rodrigue, 2005; Productivity Commission, 2023) In addition to this, large distances between production areas, ports and international markets increase the country's dependence on extensive rail and road corridors, making hinterland connectivity sensitive to capacity constraints, market concentration and climate-related disruptions (such as floods and bushfires). That illustrates that even in high level port systems, geography shapes logistics outcomes and introduces vulnerabilities that cannot be fully prevented by institutional acts solely. (OECD, 2021; Infrastructure Australia, 2022)

Last but not least, Australia's port governance framework prioritizes national security and institutional control to foreign investments, something that leads to strict screening mechanisms and increased political scrutiny, especially concerning Chinese participation in strategic infrastructure. Although these measures reinforce institutional stability and security, it restricts access to external capital and underscores the tradeoff between governance autonomy and investment flexibility in port competitiveness. (Farrell & Newman, 2019; Australia Government, 2021)

Chapter 3. Nigeria – Coastal Ports and Foreign Investment

This chapter undertakes a comparative analysis of Australian and Nigerian ports, focusing on competitiveness, infrastructure, governance politics and their integration into global supply chains. (Notteboom, 2008; World Bank, 2020) Although both countries host ports of strategic importance, notable differences are observed in economic development levels, institutional frameworks and approaches to port management. (OECD, 2011; UNCTAD, 2022) These differences generate distinct contexts that affect the evolution of the port competitiveness and affect national and regional trade performance. (Notteboom & Rodrique, 2012)

On the one hand, Australian ports play a crucial role in bulk exports (basically in agricultural and mineral products), and we can say that they are well integrated in global maritime networks. Despite their inefficiencies mentioned in previous chapters they have mature systems, supported country's developed economy and regulatory frameworks, advanced infrastructure, and operations that can reach high levels of efficiency. (OECD, 2011; ACCC, 2021) On the other hand, Africa's developing environment, lead Nigeria – the largest economy of Africa – to operate under serious challenges, for instance congestion, inefficient infrastructure and customs procedures, and legal/regulatory constraints. (World Bank, 2019; UNCTAD, 2022) However, Nigerian ports can be described as vital trade gateways for West Africa, as they present substantial growth opportunities due to increasing regional demand and strategic geographical position. (Aderamo & Obafemi, 2019)

Within this context of comparison, it would be interesting if we mention the influence and involvement of Chinese participation in the development of ports In Australia and Nigeria. Over the past to decades, China has increasingly become a prominent global player in port financing, constructional and operational activities, manly via state-owed enterprises like Belt and Road Initiative (BRI) (Cullinane & Lee, 2018; OECD, 2018). Yet, the extent and form of Chinese engagement in the Australia's and Nigeria's ports vary in a significant way.

Chinese engagement in Australian port related assets is limited, tightly monitored and shaped by considerations of national security and foreign investment screening procedures. (OECD, 2018; Hilman, 2019). In Nigeria, however, Chinese involvement has been by far more extensive, concentrating on expanding port and terminal facilities, and funding transport and

logistics, addressing “gaps” not covered by both locals and Western actors. (Brautigam, 2020; World Bank, 2019)

Through a comparison of Australian and Nigerian ports, this chapter highlights how differences in institutional frameworks, economic development and governance disparities influence the competitive performance of ports, as well as the foreign (Chinese) involvement. Moreover, it evaluates whether China’s participation has led to improvements in efficiency, port capacity and connectivity, or generated challenges concerning dependency, governance practices and sustainable development. (Cullinane & Lee, 2018; UNCTAD, 2022)

3.1. Ports of Nigeria: Overview, Challenges and Recent Developments

Nigeria’s maritime industry depends on several major key seaports, which function as the country’s principal entry and exit points for international trade. The Lagos Port Complex, consisted by Apapa and Tin Can Inland ports is the leading port facility in Nigeria, managing most of the nation’s cargo. Other important ports are the Port Harcourt (Onne), Warri and Calabar. In recent years, the opening of Lekki Deep Sea port has emerged as a significant new facility, reshaping the national port network. (Olisah, 2025)

Apapa port leads in Nigeria’s trade, with Tin Can serving as a supplementary port handling a comparatively lesser portion of imports and exports. Although these ports are vital for Nigeria’s trade and economy, they are facing inefficiencies and operational/structural challenges. Persistent congestion, inadequate facilities, inefficiencies in cargo operations and extended times, have a negative impact on trade, raise costs and affect trade competitiveness. In recent years, Lekki Deep Sea port, has quickly become a transformative deepwater facility, achieving the status of the second largest country’s port, just after operating for three years. Equipped with modern facilities, with the ability to handle larger ships and with a balanced export-import profile, Lekki Port serves as an efficient alternative to those of the traditional but congested ports mentioned before. According to trade statistics from 2025, Lekki Port handled around 13,46 million naira in its first nine months period of operation, exceeding the volumes surpassing Tin Can port and Port Harcourt (Onne). Despite, developments like Lekki Port, the overall Nigerian port network encounters considerable operational and infrastructural difficulties. (Olisah, 2025)

As it comes to the container throughput (TEU) significant volumes of cargo are handled in Nigeria’s ports. The Lagos Port Complex dominates, as Apapa Port dominates approx. 1,2

million TEUs annually (2024) (Onigbide, 2025), Tina Can Island port approx. 0,5 to 0,6 million TEUs ⁵ and Lekki Deep Sea port approx. 0,8 million TEUs in its first full operational year. Other ports such as Port Harcourt (Onne), Wari and Calabar handle smaller volumes (approx. 50.000-100.000 TEUs), because of limited infrastructure and hinterland connectivity. (Onigbide, 2025; Olisah, 2025)

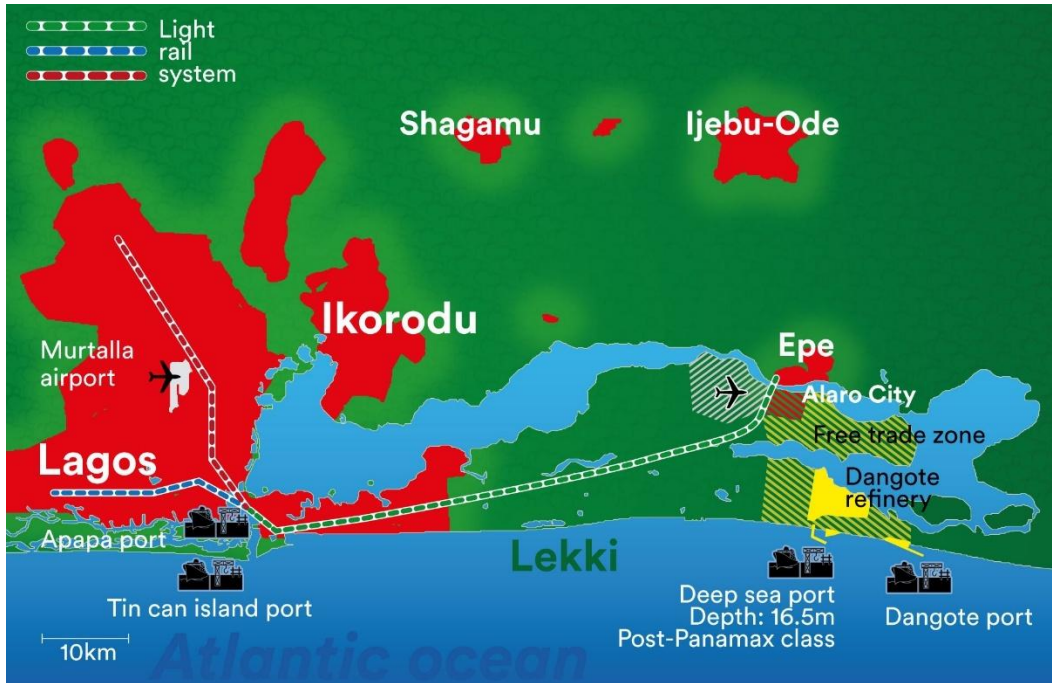
3.1.1 Shipping Routes and Hinterland Connectivity in Nigeria

Nigeria's ports are situated are embedded within maritime routes that connect Europe, Asia and America with West and Central Africa. They serve as natural gateways for regional trade, because of the country's location along the Gulf of Guinea, providing access to key global shipping lanes. (Rodrigue et al., 2020) Unlike Australia, for Nigerian ports, hinterland connectivity, is a major constraint, affecting their performance. (De Langen & Chouly, 2004) Inadequate road networks, limited rail connectivity, and underdeveloped intermodal integration severely limit cargo flows between ports and their hinterlands. (World bank, 2020) Lagos based ports (Apapa and Tin Can ports) dominate in cargo flows, as a result to their closeness to major markets and market hubs. However, persistent congestion, limited berth capacity and cargo-handling inefficiencies have historically led to the reduced service reliability and extended turnaround times at Nigerian ports. (UNCTAD, 2023) Shipping lines frequently redirect cargo to competing regional ports such as Lome in Togo and Tema in Ghana, which offer faster clearance and more efficient port operations. (World Bank, 2020)

In recent years, Chinese involvement in Nigerian port development have played an increasingly prominent role, with state owned companies leading substantial infrastructure developments. The China Harbour Engineering Company led the construction and operations of Lekki Deep Sea port. Although recent investments, made by China, have focused on improving rail connections between ports of Lagos and inland logistics hubs, these projects are still in an initial phase and have not yet fully addressed long-standing bottlenecks. (OECD, 2018) The development of Lekki Deep Sea port marks a significant transformation in Nigeria's maritime connectivity. As a modern deepwater facility, Lekki, is designed to accommodate large container vessels, aiming to strengthen country's integration into global shipping

networks while reducing transshipment through neighboring countries. (China Harbour Engineering Company, 2021; Nairametrics, 2023)

Figure 2 Map of Nigeria's ports



(Source: Wikipedia)

Unlike Western and local investors, China's approach to investing in Nigerian ports, prioritise operational efficiency and improvements in existing port infrastructure to modernize facilities aiming to transform the capabilities of the port system, rather than implementing large-scale infrastructure projects. Lekki Deep Sea port thus, illustrates how Chinese capital can reshape national maritime infrastructure, introducing modern logistics technology, deepwater capacity, and strengthening global shipping connectivity. (The Nation, 2023)

3.1.2 Chinese investments, opportunities and challenges

Chinese investments in Nigerian ports present a lot of opportunities for the country's maritime sector. As mentioned before, they have contributed to the capacity expansion, via the development of state-of-the-art facilities enabling the operation of larger container vessels and reducing the cargo transshipment to neighboring ports. (Nairametrics, 2023) Furthermore, modern logistics equipment and technology are something Chinese projects can offer in order for cargo handling, connectivity and operations to be well improved. Such investments have

the potential to attract additional foreign investments and stimulate economic activity in industrial zones surrounding the ports, enhancing Nigeria's position in regional and international markets, enhancing its competitiveness as well. Last but not least, the scale and speed of Chinese-led port projects, help minimizing and sometimes close funding gaps that local and Western investors are unable to address and when they do they struggle to fill. (UNCTAD, 2022; Shipping Position, 2024)

Despite these advantages, Chinese investments also carry a number of notable challenges. One of the main challenges is the risk of dependency, as these major infrastructure projects frequently create long-term reliance on foreign capital and contractors. Secondly, Nigeria's institutional and governance challenges (bureaucratic delays, regulatory uncertainty, and weak coordination among inter-agencies) can restrict the success of those investments and limit the achievement of their full potentials. Moreover, socio-political factors and concerns such as community resistance and labor conflicts can occur and may delay project execution and affect stakeholders' perceptions. Also, environmental and social issues may arise, due to dredging, coastal works and nearby urban development, something that requires careful management in order for negative long-term impacts to be avoided. (UNCTAD, 2022; The Nation, 2023; World bank, 2020)

According to the Logistics Performance Index (LPI), in 2022 Nigeria was ranked 91st out of 140 countries, due to inefficiencies in customs, port infrastructure, cargo handling and timeliness of deliveries. By 2023, Nigeria's LPI ranking improved to 88th out of 141 countries (2,9/5), because of its development regarding modern facilities, logistics competence, and timeliness (Customs: 2,6/5, Infrastructure: 2,4/5, International shipping: 2,4/5, Logistics competence: 2,5/5, tracking and tracing: 2,3-5, timeliness: 2,7/5). Despite Chinese involvement, country's score remains low, indicating that Nigeria still faces crucial challenges. (Market News NG, 2024)

Overall, while Chinese investments present considerable opportunities to significantly transform Nigeria's port sector and boost competitiveness, strategic planning, policy reforms, and engagement with key stakeholders are vital to minimize risks and maximise benefits, as their success is depended on domestic governance, socio-political stability and environmental management.

Chapter 4. Kazakhstan – Landlocked Logistics Challenges

While Australia gains advantages from its island geography and well-developed port governance, Nigeria struggles with port congestion and complex socio-political dynamics, Kazakhstan shows how landlocked countries confront fundamentally different logistics challenges. If we wanted to examine a country that represents a clear example of having logistical limitations imposed by its landlocked geography, that should be Kazakhstan. Without maritime access, the country depends extensively on rail and road transport corridors in order to connect with international markets across Asia, Europe and Middle East. This means that its competitiveness in global trade is closely linked to the effectiveness of the performance of its transit infrastructure, border management procedures and regional transport arrangements. (World Bank, 2023)

Being a landlocked country, extends transit times, increases transportation costs and at the same time the reliance on the infrastructure and policies of neighboring states. That directly influences country's logistics efficiency and trade reliability. According to the Logistics Performance Index (LPI) 2023, Kazakhstan ranks 79th out of 141 countries, because of its weaknesses in infrastructure quality and timeliness. (World bank, 2023) This illustrates that geography, in interaction with institutional and regulatory frameworks may constrain trade competitiveness, even where domestic port infrastructure is efficiently developed. (UNCTAD, 2022)

To overcome its landlocked constraints, associated with its landlocked status, Kazakhstan has invested in dry ports, enhanced rail connectivity, and regional transport corridors, such as the Trans-Caspian International Transport Route (TITR), which enables connectivity between European and Chinese markets via Caspian Sea ferry services and rail overland transport. By targeting lower costs, shorter transit times and deeper integration into global supply chains, these initiatives show how landlocked countries can overcome their geographical limitations and become more competitive, through strategic infrastructure investments and cross-border cooperation. (Asian Development Bank, 2022)

Figure 3 Map of TITR



(Source: https://www.ey.com/en_kz/insights/strategy-transactions/trans-caspian-international-transport-route)

Launched in 2014, and known as the Middle Corridor, TITR, represents a growing multimodal transport network connecting China and Southeast Asia to Europe via Kazakhstan, the Caspian Sea, Azerbaijan, Georgia and Turkey. The route is aimed to be a competitive alternative to the Northern Corridor, via Russia and traditional sea routes via Suez Canal, by providing shorter transit routes, while reducing geopolitical concentration risks in Eurasian trade. (Wikipedia, 2026)

Unlike conventional maritime or rail routes that operate entirely over long ocean passages, TITR integrates ferry, rail, and road networks, including Kazakhstan's rail system, Caspian Sea ferry links and the Baku-Tbilisi-Kars railway in the South Caucasus. Through this multimodal set up, goods are able to move from China to Europe in 12-15 days, significantly faster than maritime transit times which can exceed 45 days. (East-West Transport Corridor, 2025; Railways.kz, 2026) The development of this corridor has been supported through coordinated efforts among the involved countries, such as joint ventures to unify tariffs, optimize custom procedures, reduce bureaucratic delays and enhance transit operations in general. For instance, Kazakhstan, Azerbaijan and Georgia established a joint logistics company in order for the corridor to be enhanced overall (Report, 2022; Caliber, 2025; Astana Times, 2023)

In terms of freight volumes, TITR has been growing rapidly. Freight along the corridor expanded from around 0.8 million tons in 2020 tons to over 4.5 million tons in 2024,

accompanied by a market rise in container shipments, reflecting increasing demand for this alternative transport route. In addition to this, automated cargo processes that digitize and streamline customs clearance allow some container trains to complete clearance in just 30 minutes. TITR's growth includes modern hubs and terminals, such as the container terminal at Kazakhstan's Aktau port developed with Chinese collaboration, alongside new established facilities in Belarus, Budapest, and Poti's port. (Eurasian Star, 2025; Interfax, 2025; Astana Times, 2023)

Despite its strategic design aimed to provide alternative trade routes to between Asia and Europe, TITR faces several operational and structural challenges that constrain and reduce its effectiveness and competitiveness. First of all, the multimodal nature of the route adds complexity and introduces logistics challenges: repeated transfers between rail, ferry and road segments that often cause delays, especially at Caspian Sea terminals and other intermodal hubs with limited infrastructure capacity. Furthermore, the corridor faces challenges of elevating costs. Freight rates from China from Europe along the corridor, range from approximately USD 2,500 to USD 3,250 per TEU, making it less economically attractive and competitive than the Northern Corridor through Russia and maritime routes, which range from USD 1,500 to USD 2,000 per TEU. (EY, 2024)

Apart from cost inefficiencies, the TITR faces infrastructure bottlenecks and regulatory fragmentations. Current rail and port infrastructure require significant upgrades to accommodate forecasted cargo volumes, with investments regarding the expansion of the capacity approaching EUR 18,5 billion. Additionally, operational challenges including limited rolling stock, rail gauges and underutilized ferry capacity at Caspian Sea cause delays and logistical inefficiencies. Moreover, the lack of harmonized legal and administrative networks across Kazakhstan, Azerbaijan and Georgia result as regulatory barriers, customs inefficiencies, uneven tariff regimes, diminishing corridor's attractiveness. (EY, 2024)

Collectively, despite its strategic value for trade diversification in Eurasian trade, persistent operational and institutional constraints, limit its capacity to compete with already established routes and corridors in terms of cost and reliability.

Chapter 5. Comparative Insights and Concluding Remarks

5.1. Comparative framework of port and logistics competitiveness

Table 3 Comparative assessment of port and logistics competitiveness across geographical typologies

Criteria / Case studies	Australia (island)	Nigeria (coastal)	Kazakhstan (landlocked)
Geographical typology	Island state	Coastal developing economy	Landlocked economy
Governance capacity	High	Medium-Low	Medium
Logistics focus	Gateway ports	Gateway ports	Inland corridors & dry ports
Role of foreign investment	Limited and highly regulated	High (dominantly Chinese-led)	High (corridor based, Chinese-led)
Key constrained	High costs, long distances, rigidity	Congestion, institutional weaknesses, infrastructural gaps	Transit dependence, coordination challenges
Competitiveness “drivers”	Quality of governance, reliability, institutional stability	Extension of capacity, improved connectivity	Corridor performance, regional cooperation
LPI rank	19	88	79

Table 3 provides a comparative overview of port logistics of the three case studies, showing how differences in geography, governance capacity and exposure to foreign investment patterns shape varying levels of port and logistics competitiveness. This comparison shows that all three countries depend on logistics infrastructure, yet the ways in which competitiveness is achieved differ substantially across geographical typologies.

The Australian case demonstrates how strong governance, high institutional capacity and mature port infrastructure, enable gateway ports to operate reliably, despite structural challenges related to distance and cost. By contrast, the Nigerian case highlights that infrastructure expansion and foreign investment, especially from China, can improve capacity and connectivity, while remaining limited due to institutional and operational inefficiencies. For Kazakhstan, competitiveness depends less on seaport performance and more on the effectiveness of inland corridors, intermodal connectivity and cross-border cooperation, reflecting the challenges faced by landlocked economies.

Overall, the analysis shows that logistics competitiveness cannot be achieved from infrastructure by itself. Instead, it is shaped by combined influence of geography, governance quality and strategic connectivity, underlining the role of institutional effectiveness and policy coordination across national contexts.

5.2 Comparative assessment and discussion

The current chapter brings together the key findings from the comparative analysis of Australia, Nigeria and Kazakhstan, emphasizing how geography, institutional arrangements and patterns of external investment dynamics can influence logistics performance and port competitiveness. While Australia benefits from its insularity, advanced governance structures and well-established ports supporting high levels of competitiveness, Nigeria's port system remains constrained by congestion, infrastructural gaps, and socio-political complexities, notwithstanding recent capacity expansion investments. At the same time, as a landlocked economy, Kazakhstan illustrates a fundamentally different set of constraints, where competitiveness relies more on the efficiency of transport corridors, regional coordination and transit governance, than seaport performance. Taken together, their comparison highlights that infrastructure alone cannot determine ports and logistics competitiveness, instead it emerges from the interaction between geographical factors, institutional frameworks and strategic connectivity.

From a comparative perspective, the analysis reveals that the effects of the Chinese investment differ significantly across countries, depending on the existing domestic institutional and economic environments. Chinese-led infrastructure investments contributed to closing structural gaps, expanding port and corridor capacity and enhancing connectivity to international trade networks. In the contrary, Australia's restricted and limited exposure to Chinese involvements reflects the role of strong domestic institutions and national security considerations, over than infrastructure imperatives. From that, we can tell that foreign investment can boost competitiveness, but it can succeed only when governance structures are strong, regulatory systems are clear, and host states affectively align it into their broader national development priorities.

From a strategic perspective, these findings are essential for countries striving to improve their standing in global trade. For economies with coastal ports such as Nigeria, large-

scale port investments can improve capacity and connectivity, yet without corresponding enhancements in hinterland transport and institutional coordination competitiveness remains partial. In landlocked nations like Kazakhstan, strategic multimodal corridor investments and international cooperation, as seen with the Trans-Caspian International Transport Route, may mitigate geographical disadvantages, however challenges related to operational fragmentation and weak institutional alignment continue to limit overall competitiveness. These cases highlight that strategies to enhance competitiveness cannot rely solely on infrastructure, but they have to be tailored to each country's unique institutional, governance and geographical conditions.

In terms of policy, infrastructure development should be paired with institutional improvements, including streamlines customs procedures, inter-agency coordination and harmonized regulatory frameworks. Secondly, policy makers should manage foreign investments strategically, ensuring that capital inflows are aligned with transparency, long-term national priorities and sustainability. In addition to this, they should give greater attention to enhancing hinterland connectivity and integrate multiple transport modes, recognising that port efficiency by itself cannot ensure comprehensive improvements in logistics performance. As it comes to landlocked states, regional cooperation and the establishment of robust corridor governance structures are critical to lowering dependency risks and transit uncertainties.

5.3 Concluding remarks

To conclude, this study highlights that port and logistics competitiveness is shaped by the integrated effects of physical infrastructure quality, institutional framework's strength, governance effectiveness and strategic geopolitical factors. The Australian experience illustrates that strong domestic governance can deliver high levels of competitiveness without extensive external support, while nations with weaker institutional capacities may struggle to fully leverage infrastructure-led development. On the other side, the experience of Nigeria and Kazakhstan demonstrate that although Chinese involvement has contributed to increase capacity and improved connectivity, its impact is context-dependent and not guaranteed to be automatically beneficial. These findings confirm that competitiveness in port and logistics is a systemic phenomenon, depending on the interaction of multiple structural and institutional factors rather than being determined solely by the outcome of isolated projects.

Bibliography

- Aderamo, A. J., & Obafemi, A. A. (2019). Port congestion and efficiency in Nigerian ports. *Journal of Transport Geography*, 74, 105–114.
<https://doi.org/10.1016/j.jtrangeo.2018.11.004>
- Asian Development Bank. (2022). *Transport and trade facilitation in Central Asia*. Asian Development Bank.
<https://www.adb.org/publications/transport-trade-facilitation-central-asia>
- Astana Times. (2023). *Kazakhstan, Azerbaijan, Georgia to set up joint logistics company to facilitate cargo transportation process*. <https://astanatimes.com/2025>
- Australian Bureau of Statistics. (2023). *International trade in goods and services, Australia*. ABS. <https://www.abs.gov.au>
- Australian Competition and Consumer Commission. (2023). *Container stevedoring monitoring report 2022–23*. ACCC.
<https://www.accc.gov.au/regulated-infrastructure/water-and-ports/ports-monitoring>
- Brautigam, D. (2020). *Chinese infrastructure finance in Africa*. Johns Hopkins University, School of Advanced International Studies (SAIS), China Africa Research Initiative Caliber.Az. (2025). *Kazakhstan cuts tariffs to boost Trans-Caspian freight traffic*. <https://caliber.az>
- Chen, Z., & Yang, M. (2020). China's overseas infrastructure investment and the Belt and Road Initiative: Implications for global logistics networks. *Maritime Policy & Management*, 47(4), 491–507.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage Publications.
- Cullinane, K., & Lee, P. T.-W. (2018). The Belt and Road Initiative and maritime transport. In L. Wang & X. Zhang (Eds.), *China's Belt and Road Initiative: Economic geography reformation* (pp. 55–72). Routledge.
- De Langen, P. W. (2007). *Port competition and selection in contestable hinterlands: The case of Austria*. *European Journal of Transport and Infrastructure Research*, 7(1), 1–14. <https://journals.open.tudelft.nl/ejtir/article/view/3370>
- De Langen, P. W., & Chouly, A. (2004). *Hinterland access regimes in seaports*. *European Journal of Transport and Infrastructure Research*, 4(4), 361–380.
- Department of Infrastructure, Transport, Regional Development and Communications. (2022). *National freight and supply chain strategy*. Australian Government.
<https://www.infrastructure.gov.au/infrastructure-transport-vehicles/transport/national-freight-and-supply-chain-strategy>

- Ernst & Young. (2024). *Trans-Caspian International Transport Route: Strategic opportunities and constraints*. EY Kazakhstan.
- Eurasian Star. (2025). *Freight volumes along Trans-Caspian route grow in first half of 2025*. <https://www.eurasianstar.com>
- Fremantle Ports. (2023). *Trade statistics 2023*. Fremantle Ports. <https://www.fremantleports.wa.gov.au>
- Haezendonck, E. (2001). *Essays on strategy analysis for seaports*. Garant Publishers.
- Hillman, J. E. (2019). *China's maritime silk road: The impact of China's ports investments on global trade*. Center for Strategic and International Studies (CSIS).Infrastructure Australia. (2021). *Australian infrastructure plan*. Canberra.
- Infrastructure Australia. (2022). *Market Capacity Report 2022*. <https://www.infrastructureaustralia.gov.au/publications/2022-market-capacity-report>
- Intelpoint. (2025). *Apapa Port accounted for 71.6% of Nigeria's total trade value in Q1 2025 and 86.12% of total exports*. Intelpoint. <https://intelpoint.co/insights/port-activity-in-nigeria>
- Interfax. (2025). *Traffic via Trans-Caspian International Transport Route up 62% to 4.5 mln tonnes in 2024*. <https://interfax.com>
- Market News NG. (2024). *Nigeria ranks 88th out of 141 countries in Logistics Performance Index*. <https://marketnewsng.com/2024/06/19/nigeria-ranks-88th-out-of-141-countries-in-logistics-performance-index/>
- Nairametrics. (2023). *Lekki Deep Sea Port displaces Tin Can as Nigeria's No. 2 port by trade*. <https://nairametrics.com/2025/12/15/lekki-deep-seaport-displaces-tin-can-as-nigerias-no-2-port-by-trade/>
- Notteboom, T. (2010). *Concentration and the formation of multi-port gateway regions in the European container port system*. *Journal of Transport Geography*, 18(4), 567–583.
- Notteboom, T., & Rodrigue, J.-P. (2005). *Port regionalization: Towards a new phase in port development*. *Maritime Policy & Management*, 32(3), 297–313.
- Notteboom, T., & Rodrigue, J.-P. (2012). *The corporate geography of global container terminal operators*. *Maritime Policy & Management*, 39(3), 249–279. <https://doi.org/10.1080/03088839.2012.671970>
- NSW Ports. (2023). *Sustainability & trade reports 2022–2023*. NSW Ports. <https://www.nswports.com.au>
- OECD. (2011). *Competition in ports and port services*. OECD Publishing. <https://doi.org/10.1787/9789264116449-en>

- OECD. (2018). *China's Belt and Road Initiative in the global trade, investment and finance landscape*. OECD Publishing. <https://doi.org/10.1787/9789264298411-en>
- OECD. (2019). *Globalisation, transport and the environment*. OECD Publishing. https://www.oecd.org/en/publications/globalisation-transport-and-the-environment_9789264072916-en.html?utm_source=chatgpt.com
- OECD. (2023). *International transport corridors: Governance, performance, and regulatory challenges*. OECD Publishing.
- Olisah, C. (2025, December 15). *Lekki Deep Seaport displaces Tin Can as Nigeria's No. 2 port by trade*. Nairametrics. <https://nairametrics.com/2025/12/15/lekki-deep-seaport-displaces-tin-can-as-nigerias-no-2-port-by-trade>
- Onigbinde, O. (2025, December 16). *Lekki Deep Sea Port overtakes Tin Can as Nigeria's second-biggest port by trade*. **ShippingPosition** <https://shippingposition.com.ng/lekki-deep-sea-port-overtakes-tin-can-as-nigerias-second-biggest-port-by-trade>
- Port of Brisbane. (2023). *Strategic overview 2023*. Port of Brisbane Pty Ltd. <https://www.portbris.com.au>
- Port of Melbourne. (2022). *Trade and statistics report*. Melbourne. <https://www.portofmelbourne.com/publications/trade-and-statistics-report-2022>
- Railways.kz. (2026). *TRANS-CASPIAN INTERNATIONAL TRANSPORT ROUTE (TITR)*. <https://railways.kz>
- Rodrigue, J.-P., Comtois, C., & Slack, B. (2020). *The geography of transport systems* (5th ed.). Routledge.
- Shipping Position. (2024). *Lekki Deep Sea Port overtakes Tin Can as Nigeria's second-biggest port by trade*. <https://shippingposition.com.ng/lekki-deep-sea-port-overtakes-tin-can-as-nigerias-second-biggest-port-by-trade/>
- The Nation. (2023). *Assessing Lekki Deep Sea Port's economic potential*. <https://thenationonlineng.net/assessing-lekki-deep-seaports-economic-potential/>
- UNCTAD (2022). *Review of Maritime Transport*. United Nations Conference on Trade and Development.
- UNCTAD. (2023). *Review of Maritime Transport*. United Nations Conference on Trade and Development.
- Van de Voorde, E., & Winkelmann, W. (2002). *A general introduction to port competition and management*. In M. Huybrechts, M. Meersman, E. Van de Voorde & E. Van Hooydonk (Eds.), **Port competitiveness: An economic and legal analysis of the factors determining the competitiveness of seaports** (pp. 1–16). De Boeck.
- Verhoeff, J. M. (1981). *Seaport competition: Some fundamental and political aspects*. *Maritime Policy & Management*, 8(1), 49–60. <https://doi.org/10.1080/03088838100000006>

- Wikipedia. (2026). *Trans-Caspian International Transport Route*.
https://en.wikipedia.org/wiki/Trans-Caspian_International_Transport_Route
- World Bank (2019). *Enhancing Port Efficiency in Sub-Saharan Africa*. World Bank Group. <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/902091563558450951>
- World Bank. (2020). *Ports and logistics performance in Sub-Saharan Africa*. World Bank Group. <https://lpi.worldbank.org>
- World Bank. (2023). *Kazakhstan logistics and connectivity assessment*. World Bank Group. <https://lpi.worldbank.org>