



Spatial Economic Analysis of the Port of Cape Town and its Environs

By

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DECLARATION

I, Kwena Maria Letsoalo, declare that the contents of this dissertation/thesis represent my own unaided work, and that the dissertation/thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.



13 December 2024

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Date

Abstract

The spatial and temporal features of maritime services and their associated logistics functions, particularly in emerging markets like South Africa, remain poorly understood. The study responds to the research gap in understanding the ever-changing economic activity near the port and port-city interface. This thesis utilised a single-case study approach to explain the economic activity of logistics companies in the vicinity of the Port of Cape Town, in the case study of Paarden Eiland using quantitative and qualitative data collection and analysis methods. The study consisted of three research questions. To answer the first research question, the study analysed the mix of logistics firms; identifying the typologies and quantities of businesses located in Paarden Eiland. To address the second research question, the study completed a spatial distribution geographic representation of logistics firms. To answer the third research question, content analysis was conducted to determine the role of land use and planning and regulatory frameworks affecting Paarden Eiland. The findings of the study reveal that distributor and supplier firms are dominant owed to their global relevance containerisation while last-mile couriers are less dominant owed to the shifts in logistics supply chains related to e-commerce-related shifts. The study findings show that there are third-party logistics providers (3PL) and fourth-party logistics service provider (4PL) firms. The study also highlights the importance of land-use planning and regulatory frameworks fostered through land-use zoning, Spatial Development Frameworks (SDF), City Improvement Districts (CID), and Special Rates Areas (SRA) in creating a conducive environment for logistics operations on the Table Bay's District's portion of Paarden Eiland. The findings will add value to theoretical advancements in port-city relations and provide practical insights for effective land-use planning and policy formulation for Paarden Eiland through district spatial development frameworks in Table Bay District and Blaauwberg District in the City of Cape Town Municipality. The research concludes that the strategic geographic concentration of logistics firms in Paarden Eiland enhances operational efficiencies through shared resources and proximity to the Port of Cape Town, highlighting the importance of agglomeration economies. The study shows the role of land-use planning and regulatory frameworks, such as City Improvement Districts, in facilitating a conducive environment for logistics operations and this can be improved by adding port-centric logistics clusters purposefully. The study recommends adaptive approaches that consider the impact of the growth and transformation of logistics and supply chain management and the operational strategies of logistics firms through effective land-use planning and port development to improve the collaboration between port-centric cluster development and urban and regional planning in the City of Cape Town.

Keywords: Port of Cape Town; port cities; logistics clustering; agglomeration; land-use planning

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Acronyms and Abbreviations

3PL	Third-Party Logistics
4PL	Fourth-Party Logistics
CBD	Central Business District
CID	City Improvement District
CIPRO	Companies and Intellectual Property Registration Office
CoCT	City of Cape Town
CSA	Combined Statistical Area
EDC	European (central) Distribution Centres
GIS	Geographic Information System
GVA	Gross Value Added
ICT	Information Communication Technology
IDP	Integrated Development Plan
MIDA	Maritime Industrial Development Areas
MLD	million litres per day
OECD	Organization for Economic Cooperation and Development
PECID	Paarden Eiland City Improvement District
PLC	Port Logistics Cluster
SARS	South African Revenue Services
SRA	Special Ratings Area
TDMC	Trade and Distribution Maritime Centre
TNPA	Transnet National Port Authority
USA	United States of America

Chapter 1: Introduction

The purpose of this chapter provides the context for the exploration of ports and cities, focusing specifically on aspects that influence the nature of economic activities in the vicinity of ports. It begins by presenting the research background, providing relevant definitions and characteristics of ports, port cities, and their dynamic interactions. The chapter highlights the complexities inherent in understanding land use in port areas and the significance of the evolving nature of port-city relationships amid globalisation and technological advancements. Following the background, the research problem is explained, emphasising the need for further investigation into the spatial and temporal attributes of maritime services, particularly in emerging markets. This is followed by the outline of the research aim, research questions, and objectives, which guided the research to analyse the mix and spatial distribution of logistics firms and the impact of land-use planning in the vicinity of the Port of Cape Town. To provide an understanding of the methodology, the chapter also details the research design and summary of methods utilised. Finally, it concludes with an overview of the thesis structure, outlining the logical progression of subsequent chapters that follow.

1.1 Research Background: Understanding Logistics in the Evolution of Port-City Dynamics

This section provides the historical and contemporary trends in maritime economics. The research background highlights the evolving concept of ports and port cities, acknowledging various perspectives and definitions influenced by maritime economics, logistics, and urban development (Hein and van de Laar, 2020; Ducruet, 2011). As ports remain significant in global trade networks, understanding their economic and spatial dynamics is essential for planning and policy-making. The evolution of trends in maritime economics and port-centric logistics clusters provides the backdrop for exploring how logistics firms agglomerate in the vicinity of ports, contributing to the broader understanding of port-city interactions against the backdrop of technological and economic shifts. A port structure can be identified based on function and the size can vary from a tiny wharf for docking a ship to an expansive hub with numerous terminals and an agglomeration of industries. Port descriptors include waterfront, estuary, and maritime base, shoreline and multimodal and intermodal facilities, distribution and logistics industrial zones, mobility and trade corridors or gateways, maritime industrial development areas (MIDAs) and trade and distribution maritime centres (TDMCs), industrial clusters and distriparks, free zones, trading hubs, and networks (Bichou and Grey, 2005). Ports need not be limited to seaports. For example, in the United States of America (USA), the term port can refer to airports.

To explore the complex and ever-evolving relationship between ports and cities, it is important to first state the definitions and characteristics of ports, port cities, and their interconnected dynamics. There are several definitions for ports, port cities, and cities with ports (Hein and van de Laar, 2020). Ports are constructions with distinct land and water boundaries (Momirski et al., 2021). They are surrounded by a fence, readily identifiable on satellite and orthophoto imagery, and serve certain purposes. When seen through the perspective of land use; the present and planned future functions or socioeconomic

purpose of the land, the understanding of ports, their function, and their contour to neighbouring urban and rural regions becomes difficult (Hein, 2021). In contrast to urban and rural regions, where land use has been mapped and defined for generations, the usage and function of land and water within and around port areas have served multiple functions and are undefined on land use maps for centuries (Hesse, 2010; Hein, 2021). This creates concerns about the function and interpretation of the port area in connection to neighbouring spaces and their history. According to Hein and van de Laar (2020), the word port-city has not yet been sufficiently defined in the literature, perhaps because the two ideas of port and the city are continually developing over time and several disciplinary perspectives examine it (Ducruet, 2011; Hein and van de Laar, 2020).

A port city is a city with a marine centre that connects onshore and offshore transportation networks. Maritime economy, logistics and urban development literature have contributed towards defining port-city, however, due to the ever-evolving dynamics of ports and international trade, there are many definitions. This diversity of definitions in literature also extends to port regions and port regionalisation (Hein and van de Laar, 2020). This diversity presents the need for a nuanced understanding of how ports and cities coexist, interact, and influence each other over time. These shifts in port-city dynamics highlight the growing complexity of managing their spatial, economic, and functional interrelations in the face of evolving global trends. Economic activity taking place at ports and their vicinities are denoted by firms such as freight forwarders that serve as crucial intermediaries in the logistics network, managing the shipment process from origin to destination. They ensure compliance with regulatory requirements and address the complexities of global trade, particularly in high-traffic port areas. This role is increasingly supported by advanced technologies that facilitate efficient tracking and scheduling (Heitz et al., 2020). Third party logistics providers are also prominent economic activity near ports that enhance operational efficiency by outsourcing logistics activities, such as warehousing and transportation management, allowing businesses to focus on core operations (Chen et al., 2024). Transportation companies are dedicated to moving goods through various modalities and their proximity to ports is vital for improving operational efficiency (Vitellaro et al., 2021). The concentration of these firm types near the ports reflects the area's strategic importance as a logistics hub, further enhanced by agglomeration economies that promote shared infrastructure and collaboration among firms.

Freight forwarders are indispensable within the logistics framework, consolidating shipments and coordinating services such as customs clearance and insurance. Their functions are critical in mitigating delays and ensuring compliance with complex regulations. The reliance on modern technologies in this field allows for improved navigation of port congestion and optimised logistics operations (Cooper et al., 2024). Consequently, freight forwarders not only facilitate connectivity within supply chains but also contribute significantly to economic growth through efficient logistical coordination. The recent surge in the significance of third-party logistics providers stems from the evolutions of supply chain management; these providers offer comprehensive services that span the logistics spectrum, enabling firms to improve efficiency through outsourcing (Holl et al., 2017). The presence of warehousing plants and transportation services at logistics hubs like ports illustrates the pivotal role of these providers in ensuring smooth product flow. Although courier services, representing

last-mile delivery, are less prevalent, they indicate adaptations to modern market demands such as e-commerce, showcasing an evolving logistics landscape (Tiupysheva et al., 2023).

Research indicates that the strategic engagement of stakeholders boosts profitability and addresses risks in the maritime logistics environment (Vitellaro et al., 2021). Recognising the diverse roles of these firms allows for tailored strategies that leverage their strengths while addressing operational challenges, thus fostering a robust maritime logistics framework. Logistics firms act as essential facilitators in supply chain management, overseeing various activities such as inventory management and transportation planning. Their strategic location decisions indicate the importance of accessibility to ports, significantly affecting operational efficiency (Tiwari et al., 2003). As global trade dynamics evolve, these firms adapt to technological advancements and market demands, enhancing their capacities to optimise supply chain processes. Collaborative approaches among different logistics stakeholders are crucial in maintaining competitive advantages and addressing emerging logistical challenges, ultimately maximising responsiveness within the logistics network (Vitellaro et al., 2021).

To better understand the modern challenges and opportunities in port-city development, exploring how these dynamics influence land use, infrastructure, and regional economic integration evolution is essential. The evolution of spatial economic dynamics of seaports and city ports has been observed since the 1980s' when the traditional role of seaports was challenged. Urban planning and traffic management is an interdisciplinary profession that encompasses multiple disciplines such as economic geography, and the dynamic between the port and the city has gained much scrutiny from scholars from related fields (Kokot, 2008). According to Hayuth (1989), it is constantly necessary to reassess the study and comprehension of a port's interrelationships and to reevaluate new prospects. The port-city interface region cannot be regarded as distinct from the surrounding metropolitan environment. The port-city interface must be evaluated in the context of a larger system (Hayuth, 1989).

Technology, global trade, recreational activities, and increased tourism are only a few of the multiple external factors that have a direct influence on the future growth of this valuable urban area (Hayuth, 1989). Ports are a vital component of the maritime network ecosystem and play a crucial role in international trade. Since the 1950s, increased industrialisation and the containerisation revolution have compelled such ecosystems to quickly adapt. Additionally, it produced a change in port-city ties, particularly in terms of geographical closeness (Wang and Ducruet, 2012; Wang *et al.*, 2022). The rapid expansion of port industrial zones, which are sometimes unfit for human habitation, and the increase of economic activity in cities, which was additionally facilitated at the port, resulted in the eventual separation of port and city. As friction, centred mostly on the utilisation of space, intensified, the management of external economic factors grew more complicated and port activity shifted away from cities (Acciaro, Renken and Dirzka, 2020). Commonly, port-city evolutionary models account for technology progress as a factor in port-city demarcation based on distance between and difference in economic activities characterizing the port and the city. In Hong Kong, Singapore and Hamburg, and port re-establishment or ports away from the shoreline is limited by the administrative borders of the port city (Acciaro, Renken and Dirzka, 2020). In such cases, port migration or relocation takes a different form (Schubert, 2008). The literature highlights the importance of adopting innovative

strategies to harmonise port and city development while addressing their shared challenges and maximising mutual benefits. This perspective emphasises the critical role of geographic dispersion and network effects in shaping the technological and operational dynamics of port systems, port industrial zones, and their interactions with urban centers.

To understand the contemporary dynamics of port systems and port industrial zones, it becomes crucial to analyse how advancements in maritime technology and connectivity influence the spatial integration of port industrial zones and port cities within global and regional networks. The groundbreaking contribution of Hagerstrand (1967) on the geographical dispersion of innovations may be viewed as a significant reference for selecting the pertinent port and maritime research in the fields of geography and historical development and constructing an ideal conceptual configuration. Spatial diffusion encompasses all factors that lead to movements, migration within geographical space, and backlash consequences formed in this region as a result of these movements. Diffusion might be associated with a migration motion accompanied by relocation, or an expansion move. Hagerstrand's (1967) study integrates hierarchy and proximity factors, as innovations permeate from major to smaller inner cities and across local as opposed to distant areas. This context informed Ducruet and Itoh's (2022) analysis of port system studies, which examines the effect of shipping innovations on traffic concentration among nearby ports along a certain maritime region (Ducruet and Itoh, 2022). In terms of port-city linkages, it is acknowledged that maritime advancements have contributed to urban expansion during past development waves (Pumain et al., 2009), however, in a broader sense, the most sophisticated technologies are frequently clustered in the largest cities (Pumain, 2006). The importance of distance in spatial clusters in terms of potential conflict for the spread of innovations makes the addition of a network dimension essential (Barthelemy, 2014). How ports are interconnected illustrates the technologically-influenced operational dynamics. The literature highlights the need for adaptive strategies to ensure that port-city linkages and port industrial zones remain robust and sustainable in an era of rapid technological and economic transformation.

Interrelationships between the port and the city are in continual flux, with the most notable shift of port areas away from urban cores. According to Hoyle's (1989) model, the city and the port have had a strong relationship from ancient times and the Middle Ages. However, tremendous economic and industrial expansion in the 19th and early 20th centuries compelled ports to expand outside city limits, with linear quays and breakbulk industries (Kowalewski, 2021). In Hoyle's (1989) model, city and port were in a symbiotic dynamic from medieval times, until rapid commercial and industrial growth in the 19th and early 20th centuries compelled ports to develop further from city borders, with linear quays alongside breakbulk industries (Ducruet and Itoh, 2022). Despite the spatial flexibility of circulation afforded by the ocean compared to terrestrial regions, marine networks are not spread randomly (Ducruet and Itoh, 2022). Natural elements such as shoreline, wind, and ice, as well as commercial imperatives such as fuel cost, delivery time, and historical ties, govern their routes (Ducruet and Zaidi, 2012; Wang and Ducruet, 2012; Ducruet, 2020; Ducruet and Guerrero, 2022; Ducruet and Itoh, 2022). Therefore, marine networks may be seen as gravitational urban networks with multi-faceted spatial characteristics (Ducruet, 2020; Ducruet and Itoh, 2022). Historical relationships, marine economic and trade policies, and route dependency form and contribute to the resilience of ports and port cities over many eras of growth (de Martino, 2020; Hein and Schubert, 2021; Ramos, 2021). On the one hand,

generic spatial processes associated with the cyclical growth of transport hubs, such as agglomeration and congestion, may in certain instances be adequate to explain the trajectory of port cities (de Martino, 2020; Hein and Schubert, 2021; Ramos, 2021; Ducruet, 2020; Ducruet and Itoh, 2022). On the other hand, distinct geographical settings, policy, legislation, and firm-specific factors and initiatives might alter broad patterns (Jacobs, et al., 2010; Li et al., 2021).

Containerisation is one of the earliest maritime innovations that revolutionised global trade (Notteboom, 2011; Notteboom, Parola and Satta, 2019; Ducruet, 2020; Ducruet and Itoh, 2022). Malcolm P. McLean, known as the father of containerisation, created a phenomenal innovation that is comparable to the steam engine's by Robert Fulton (Mayo and Nohria, 2005). There were two notable innovation transitions; the first being from sail to steam and the second being from breakbulk to containers are recorded to be technological revolutions, with great far-reaching impact far beyond shipping, affecting the dynamics of international trade and economic development (Ducruet and Itoh, 2022). According to Ducruet and Itoh (2022), the improvements reduced trade costs by 23% for steam and 16% for containerisation, while increasing international trade by 400% and 471%, respectively, during the first (1870–1914) and second (1944–1971) phases of globalisation. However, there is still disagreement regarding the relationship between commercial expansion and technological advancement (Jacks and Pendakur, 2010).

Current research on technology and innovation in ports is centered on the factors influencing the spatial spread of the technological advancement (Saint-Julien, 2004; Witte *et al.*, 2018; Koukaki and Tei, 2020; Ducruet and Itoh, 2022). While ports differ in of historical background, geographic features, and technical development, the two notable innovations both improved port productivity and ship turnaround times immensely (Palmer, 1999). The two innovations also improved voyage regularity and safety through liner shipping schedules and fostered the growth of the hinterland through intermodal connectivity (Ducruet and Itoh, 2022). However, a systematic comparison between those two transitions remains to be done (Ducruet and Itoh, 2022). In their study of the review of innovations in the maritime sector, Koukaki and Tei, (2020) also found that academic research is extremely dispersed and frequently focuses on case studies such that it was difficult to generalise the study results from the study. Using information and proof from international shipping networks, Ducruet and Itoh (2022) investigated the spatial drivers of innovation. Their research, which compared the spread of steam and container shipping at the port city context and globally between 1880 and 2008, was founded on untapped shipping and urban data (Ducruet and Itoh, 2022). Three major topics emerged from the literature that informed their study's analysis: network connection, port system evolution, and urban effect (Ducruet and Itoh, 2022). In contrast to most previous studies, which are mostly topological and rather static, this method is novel in the field of port connectivity investigations since it is temporally long-term and takes node and linking attributes into account.

Digitalisation is a crucial component of the new economy of the fourth industrial revolution. The optimal port-city solution must address the requirement of both the urban planner and the port management to examine potential steps that would minimise the impact of specialised port facilities on the city and vice versa (López-Bermúdez et al., 2020). Due to the closeness of port infrastructure to urban areas, port-city integration schemes require special attention (Acciaro et al., 2020; Gurzhiy et

al., 2021; Ma *et al.*, 2021; Bedoya-Maya and Calatayud, 2022). According to Lopez-Bermúdez *et al.* (2020), global advancements in technology and trade have led to a shift in maritime transportation from port-to-port to door-to-door. The expansion of the port hinterland into the interior necessitates efficient and effective land transport, necessitating the establishment of an intermodal transport chain. This necessitates the establishment of industrial parks or logistic activity zones to house these infrastructures (López-Bermúdez *et al.*, 2020). The port serves as a link between the city and its regional development (Notteboom and Rodrigue, 2005; Raimbault, 2019; López-Bermúdez *et al.*, 2020; Ma *et al.*, 2021; Sakalayan *et al.*, 2022). Ports not only facilitate trade and industry, but they also promote economic progress through the compounding effect of port cluster activities (Zhang and Lam, 2013). There is often no universal definition of the concept of port city because of the intricate interactions of multiple networks and regions in one area. (Wang and Ducruet, 2012; López-Bermúdez *et al.*, 2020).

Over the last five decades, there has been a growing body of work on the link between a port and its surrounding urban regions (Monios *et al.*, 2018; Hein and van de Laar, 2020). Literature in this field developed rapidly as many port cities were losing their port operations and an aspect their identity (Ducruet 2011). Publications addressing these difficulties from diverse aspects focus on the European environment. (Hein and van de Laar, 2020). According to Guo and Qin (2022), port-city coupling systems are based on historic waves/stages of port development, intergenerational stages of port development, and evolution. Because of intergenerational differences in ports, the impact of port functions on the evolution of city functions is different, resulting in some level of differences in the development of port cities (Guo, and Qin, 2022). Further research is required on the emergence of 'flow space' and flow space theory in understanding current port spatial economic transitions.

"The port–city coupling system and spatial correlation are new perspectives in studying the port–city relationship" (Guo & Qin, 2022: 1). The flow space and spatial distribution of activities in ports promote economic location, modify temporal and spatial relationships, and challenge the traditional port-city relationship (Guo & Qin, 2022). Guo and Qin (2022) used Chinese coastal port cities as an example to design two network systems founded upon the notion of 'flow space' and the 'port-city relationship'. Guo and Qin's (2022) study examines the network properties and merging patterns of port-city relationships in the context of regionalisation. Guo and Qin (2022) describe two port network systems. According to a recent study, spatial distribution elements and port functions are the primary factors influencing the coupling features of port cities from the lens of 'flow space' (Guo & Qin, 2022).

1.2 Research Problem

The contemporary spatial and temporal aspects of maritime operation are poorly understood, particularly in developing countries and cities of the south (Ye and Jiang, 2021). As a result of the fourth industrial economy's globalisation and new technology revolution, the port's role is expanding and becoming more of an integration platform for production elements (Jacobs and Notteboom, 2011). The port's fundamental purpose is transformed into a hub for the 'factor flow' between the economic hinterland and other locations (Wenyuan *et al.*, 2019; Zhang and Yun, 2019; Guo *et al.*, 2020; Guo and Qin, 2022). The maritime shipping industry, which transports the movement of multiple industrial

elements, is a crucial node in the construction of this circulatory network. It completes the network of cargo flows, capital, technology, skills, and information between the port and the urban area in which it is located, so creating the port urban region's 'flow space' (Zhang and Yun, 2019). After the ports have evolved into a system typified by port regionalisation, not only are there transit links between them, but there are also more non-port industries moving there, and urban agglomerations are progressively driving their expansion. However, the usage and purpose of land in port regions have not been delineated on land use maps for centuries. (Hesse, 2010; Hein, 2021). In this regard, further research is required. Using Paarden Eiland as a case study, the research contributes to the gap of knowledge pertaining to the land-use mix in the vicinity of ports.

1.3 Research Aim, Questions and Objectives

1.3.1 Research Aim

The aim of the study is to analyse the agglomeration of logistics firms in Paarden Eiland, in the vicinity of the Port of Cape Town.

The aim of this study is to analyse the agglomeration of logistics firms in Paarden Eiland, located near the Port of Cape Town, and to understand how these firms interact spatially and functionally within this strategic urban-port interface. The study seeks to contribute to the broader discourse on port regionalisation and port-city dynamics by focusing on the land-use mix and spatial organisation of logistics activities in view of a rapidly evolving global economy and technological landscape. By doing so, the study not only aims to contribute to theoretical knowledge but also to provide practical insights into effective land-use planning and policy formulation for logistics planning related to ports and their surrounding regions. Essentially, this research aims to enhance understanding of how logistics agglomerations like Paarden Eiland drive economic development and urban growth in the vicinity of ports while addressing contemporary challenges of spatial integration, land-use management, and sustainable development.

The research is driven by the recognition that ports, such as the Port of Cape Town, are no longer merely transit hubs for goods. Instead, they have become dynamic platforms for the flow of production factors including capital, technology, information, and skills, connecting economic hinterlands to global networks. The role of ports has expanded beyond transportation to become critical nodes in industrial and logistical systems, often creating synergies between maritime services and urban functions. However the spatial and temporal features of maritime services and their associated logistics functions, particularly in emerging markets like South Africa, remain poorly understood.

Through an analysis of Paarden Eiland, a key logistics cluster in proximity to the Port of Cape Town, the study aims to address significant gaps in understanding the interplay between land-use patterns, logistics firm agglomeration, and the broader urban and regional context. This includes examining how technological advancements and globalisation influence the spatial organisation and functionality of logistics activities and how these activities, in turn, shape the "flow space" between the port and its surrounding economic nodes and districts.

1.3.2 Research Questions

To achieve the aim of the research, the following three questions were formulated:

1. What is the mix of the logistics firms located in Paarden Eiland, in the vicinity of the Port of Cape Town?
2. How are the logistics firms spatially distributed in Paarden Eiland?
3. What is the role of land-use planning and regulation in influencing the mix and placement of logistics firms in Paarden Eiland?

1.3.3 Research Objectives

The research objectives are to:

1. To analyse the mix of logistics-related firms located in Paarden Eiland, in the vicinity of the Port of Cape Town.
2. To examine the spatial distribution of logistics-related firms in Paarden Eiland.
3. To assess the role of land-use planning in influencing the mix of logistics firms in Paarden Eiland.

1.4 Research Design and a Summary of Methods

The study is based on a mixed methods and single-case study approach. The methodological approach is based on the aim of the study and it is outlined based on the three research questions as summarised in Chapter 4 (section 4.3). To determine the mix of logistics firms in Paarden Eiland, georeferenced data was obtained using AfriGIS, which provided a comprehensive list of logistics-related firms in the area. This data was complemented by GIS shapefiles from the City of Cape Town's Open Data Portal, specifically focusing on land administration data which includes cadastral data, delineation of suburbs and economic infrastructure. The analysis involved frequency analysis to classify the firms according to their logistics activities. For assessing the spatial distribution of logistics firms, georeferenced data was again sourced from AfriGIS. Additional GIS shapefiles related to economic development corridors were obtained from the City of Cape Town Open Data Portal. Spatial analysis in GIS software was employed to visualise and understand the clustering and distribution patterns of these firms within Paarden Eiland. To investigate the influence of land-use planning and regulation on the logistics firms' mix and placement, data on zoning and applicable spatial plans were collected. This included GIS shapefiles from the City of Cape Town City Map Viewer, as well as district plans relevant to the Table Bay and Blaauwberg administrative areas. The analysis combined spatial analysis techniques with content analysis of the Paarden Eiland CID Business Plans to identify themes and regulatory frameworks impacting logistics operations. Table 1.1 provides summary of the research design and methods explained above.

Table 1.1: Summary of Research Design and Methods

Research Setting: Single-case study approach Case Study: Paarden Eiland			
Research Question	Data	Data Source	Data Analysis Methods
1. What is the mix of the logistics firms located in Paarden Eiland, in the vicinity of the Port of Cape Town?	Georeferenced data of logistics-related firms located in Paarden Eiland.	Georeferenced data from AfriGIS. GIS Shapefiles from City of Cape Town Open Data Portal (Land Administration Data)	Frequency analysis. Classification of Economic Activity.
2. How are the logistics firms spatially distributed in Paarden Eiland?	Georeferenced data of logistics-related firms located in Paarden Eiland .	Georeferenced data from AfriGIS. GIS Shapefiles from City of Cape Town Open Data Portal (Economic Development Areas and Corridors)	Spatial analysis in GIS software.
3. What is the role of land-use planning and regulation in influencing the mix and placement of logistics firms in Paarden Eiland?	Zoning information Applicable spatial plans	GIS Shapefiles from City of Cape Town City Map Viewer and Open Data Portal City of Cape Town district plans (Table Bay District and Blaauwberg District Plans) Paarden Eiland CID Business Plans	Spatial analysis in GIS software Content analysis of plans

Figure 1.1 below provides the locality map locating the Paarden Eiland case study in the national and municipal context. The City of Cape Town municipality provides an overview of the area's geographical layout. It delineates the municipal administrative boundary, highlighting significant logistics landmarks such as the Port of Cape Town and Cape Town International Airport. The map also illustrates major transport routes, including arterial roads and railway lines, which are crucial for understanding the connectivity in the region. Paarden Eiland is marked in red within the city, highlighting its location and relevance to the logistics landmarks and routes illustrated. Additionally, an inset map places Cape Town municipality within the broader context of South Africa, offering a sense of its geographical location.

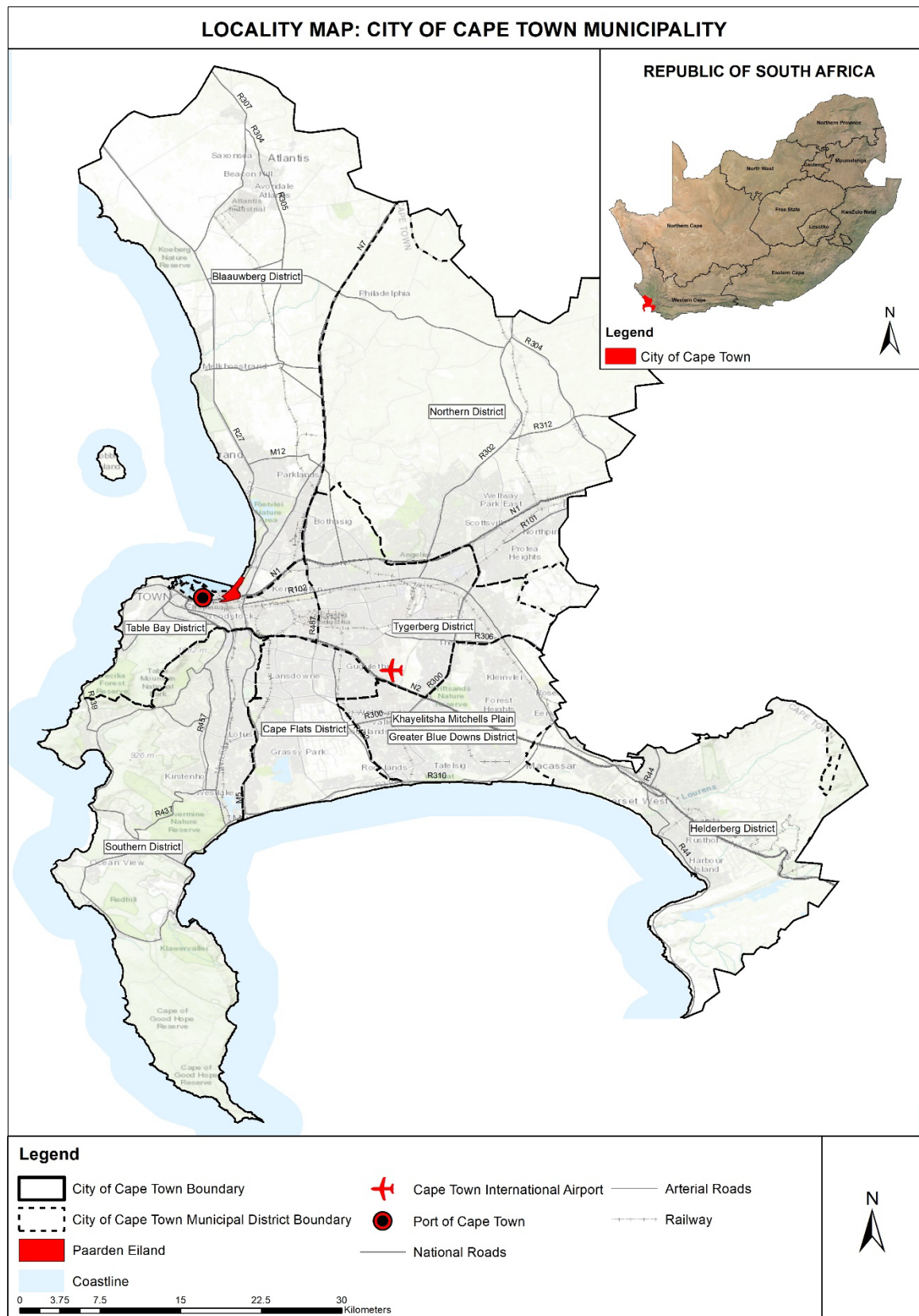


Figure 1.1: Locality Map

1.5 Contributions of the Study

This study makes practical contributions to the analysis and understanding the logistics economic activities within port-city contexts, particularly focusing on the Paarden Eiland area adjacent to the Port of Cape Town. By employing a case study approach, the research explains the typologies of logistics companies operating adjacent to the Port of Cape Town. This technique enables a more nuanced study of the enterprises' mix and spatial distribution, as well as the regulatory factors that impact their activity. The integration of both descriptive and explanatory methodologies contributes to context-specific knowledge and descriptive statistics of the study area. The knowledge and analysis of the study area contribute to knowledge of logistics operations trends in port cities, thus contributing to testing theoretical knowledge of clusters and provides tangible evidence that can inform land-use management and spatial development frameworks for Paarden Eiland. The contributions to planning practice are elaborated in section 6.1 of the thesis.

1.6 Limitations of the Study

The first limitation of the study is inherent to a single-case quantitative and qualitative analysis, which limits the findings' generalisability and applicability to other circumstances. The second limitation of the study is that the methodology applied to this study does not address the relationships, interactions and governance of the concentration of firms located in Paarden Eiland. The third limitation is that the study's focus on current logistics firm activity mix and spatial and their spatial distribution does not fully account for current future changes or broader economic trends in the City of Cape Town municipality that influence the logistics landscape beyond Paarden Eiland. The fourth limitation is the rapid evolution of global trends in logistics and urban planning affects the relevance and longevity of the study's findings and conclusions.

1.7 Thesis Structure

This section outlines the logical flow of the research report chapters. Chapter one provided the research background, stated the research problem and defined objectives and questions. Chapter two discusses and summarises existing knowledge and trends in port cities and logistics literature. Chapter three provides the theoretical perspective of port logistics clusters and cluster theory and related economic concepts. Chapter four describes the research design and approach. Chapter five presents and discusses the findings of the study. Chapter six concludes the thesis and provides recommendations for future planning and research.

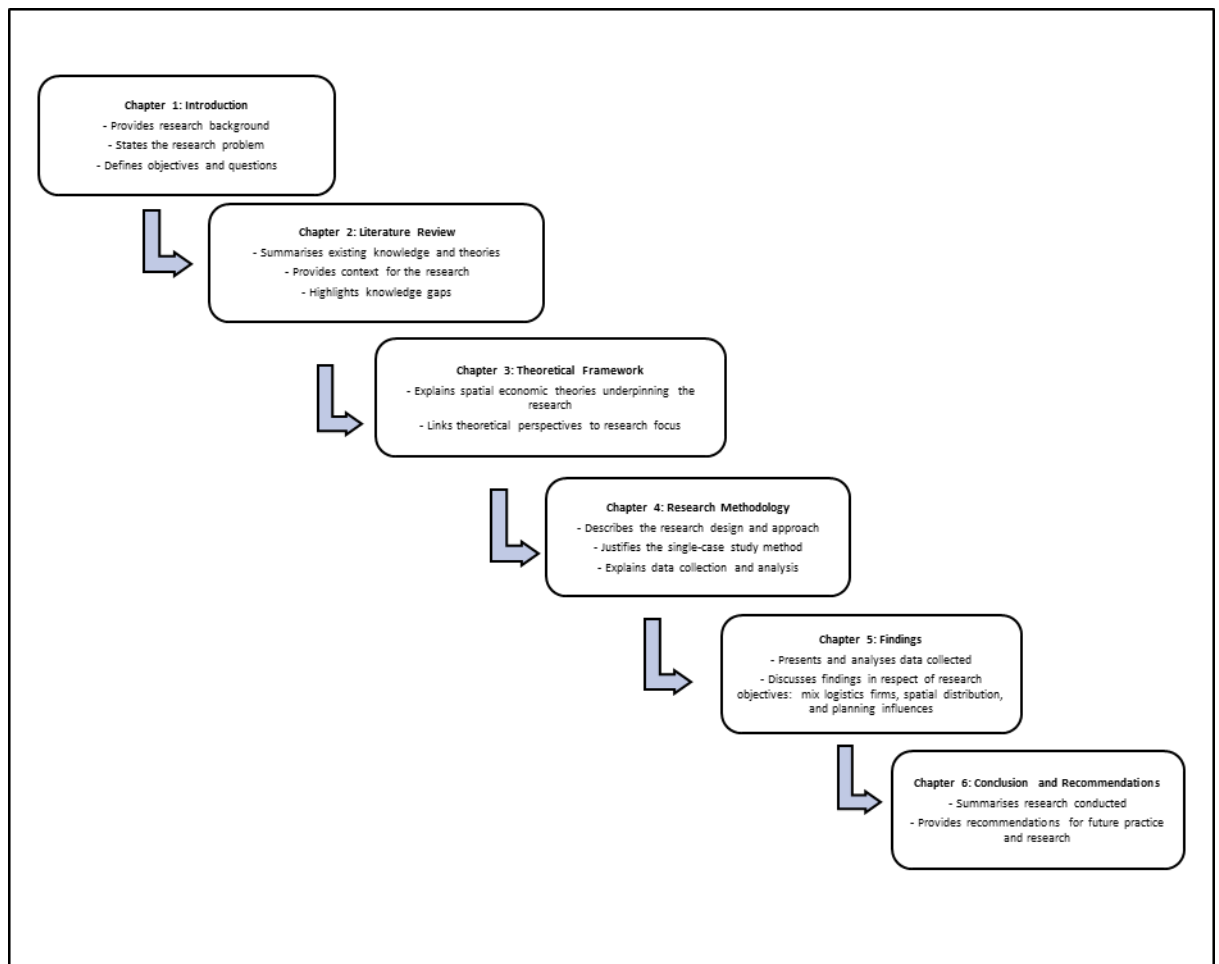


Figure 1.2: Thesis Structure

Chapter 2: Literature Review

The chapter presents a structured broad understanding of the global dynamics highlights regional advancements in logistics activities in the vicinity of ports, the function of ports in global trade. The discussion then transitions to integration within transport and supply chains, which links to the changes of logistics industry and the impact of factors such as location, cost of land, building size, and the rise of e-commerce. This followed by a discussion of the latest economic agglomeration and the distribution and co-location of firms in the vicinity of port, culminating in the concept of port-centric logistics clusters. Lastly the chapter summarises they findings from literature review.

The previous chapter provided the background of factors that influence the nature and characteristics of economic activity in ports and their surrounding areas and highlighted the knowledge gap of impact of contemporary global dynamics. This chapter provides a summative discussion of the existing literature related to shifts in the logistics global logistics and supply chains. The purpose of this literature review is to synthesise various factors influencing logistics activities and their spatial distributions as integral functions of ports in international supply chains. The first section discusses the spatial shifts in logistic activities (Section 2.1). The second section elaborated on the shifts of logistics concepts and how they impact location decisions and types of logistics firms near ports (Section 2.2). The third section delves into the function of ports in international supply chains in light of the shift highlighted in Section 2.1 and 2.2 (Section 2.3). The fourth section explains what impacts the locational decisions of logistics firms; highlights various economic factors and types of firm operations (Section 2.4). The fifth section briefly summarise categories of firms based on their logistics functions (Section 2.5). The sixth section provides an analytic account of the spatial distribution of logistics firms (Section 2.6). The seventh section discusses the role of land use planning and regulation in shaping current global logistics trends. Lastly, the chapter provided a synopsis of pertinent insights from the research mined in literature (Section 2.8).

2.1 Spatial Shifts in Logistics Activities

Within transcontinental economics, it is common to observe that regional zones or nations follow various developmental pathways throughout time (Hesse, 2008). This is because of the heterogeneity of manufacturers, suppliers, distributors and complementary logistics across nations. Nevertheless, as a result of globalisation, regional growth is influenced by that of other regions (Bichou and Gray, 2005; Hesse, 2008). A regional zone that delays toadapt in global technological progress will follow a different route of progress and growth but will be influenced by current technological advancements applied in different places. Therefore, numerous logistics changes developed in Europe may be applied faster or include improvements in different places (Hesse, 2008; Monois et al., 2016).

Modern logistics are reshaping urban areas, with distribution firms preferring suburban and ex-urban locations (Hesse, 2008). Modern logistics are fundamentally shaping the function and character of

urban places, with logistics networks increasingly being established distant and independent from cities (Hesse, 2008). Studies have confirmed a growing competitiveness, complementarity and collaboration between ports and inland locations for placing distribution operations, driven by various geographical, economic and logistics factors (Monios et al., 2016). A duality in the geographical distribution of port-related activities is becoming evident. In certain areas, these distribution functions are shifting from the ports to inland sites. This trend is influenced by various factors, including 'push factors' like port congestion and limited land for container operations, as well as 'pull factors' such as the expansion of intermodal corridors, the role of inland terminals, and the evolving economic landscape in the surrounding regions (Hesse, 2008). Hesse's (2008) research examines the historical relationship between urban areas and logistics, urban development shifts in products distribution, city region-specific characteristics of freight flows, locational dynamics, and special freight-related urban difficulties and conflicts. Hesse (2008) suggested that modern logistics substantially shapes the function and character of metropolitan areas, owing to the fact that logistical networks are increasingly created outside of cities. These changes have an impact on both the city's traditional role as a centre of goods merchandising, which is being redesigned under the banner of globalised distribution regimes, and the urban structure, which is being shaped by rising distribution firm preferences for suburban and former urban locations (Hesse, 2008).

The focus on 'port-centric logistics' indicates that certain nations are re-evaluating ports as potential sites for major distribution nodes (Monios et al., 2016). As a result, there has been a rise in both contest and support between ports and hinterland areas for distribution operations, influenced not just by market dynamics in international trade, but additionally by institutional frameworks and network governance links among the participating stakeholders (Monios et al., 2016). The Monios et al., (2016) document illustrates a summation of regional alternatives across the globe to develop an ideal configuration for determining the types of distribution operations are best suited to ports and which to the inland or hinterland, considering spatial, economic, and supply chain environment. Empirical research has been gathered from a range of regional zones, including all continents except Antarctica (Monios et al. 2016).

2.2 Shifts in Logistics Concepts and Locations

2.2.1 Shift in logistics firms land use pattern near ports

This section highlights global shifts in logistics firms near ports and changing land use patterns that reflect the evolution of globalisation and industrialisation. The role of ports as logistics hubs is evolving, shifting from multinational functions to more regionally integrated activities (van de Lugt and de Langen, 2005). The findings of Kang's (2020) descriptive analysis of the Port of Los Angeles study offer empirical support for the idea that spatial shifts influence warehouse location decisions. The majority of warehouses constructed between 1951 and 1980 are situated within a 20-mile radius from the central business district (CBD), which is one of the traditional industrial zones surrounding the port complex and central urban areas. In contrast, more recent developments have been situated within 40 and 60 miles of the CBD (the Inland Empire areas near Ontario, San Bernardino, and Riverside) (Kang, 2020). In particular, the distribution of the biggest warehouses (more than 300,000 square feet)

stood out from the rest (Kang, 2020). Based on data from Western Europe, van de Lugt and de Langen (2005) talk about the function of ports in international supply chains and the potential to draw in new business ventures in the logistics sector. Their main contention is that, as logistics concepts—namely, the consolidation of export flows (central distribution centres) and direct or decentralised delivery—evolve, so does the importance of ports as sites for logistical operations. It is argued that ports will eventually lose their multinational role as logistics concepts evolve towards central coordination and more decentralised physical distribution, to be replaced by logistics operations that have a more regional role and more robust or strong integration with production activities (van de Lugt and de Langen, 2005). The implication of this is that ports face contest from hinterland areas for value-added logistics operations. The argument of logistics establishments gives a basis for explaining the growing relevance of questions such as “What logistics activities can ports attract?” and “What is the appropriate strategy to result in this?” (van de Lugt and de Langen, 2005).

2.2.2 E-commerce

Location shifts in logistics anticipated are because contemporary surge in e-commerce and online shopping has significantly increased the focus on delivery turnaround time such as same-day or hourly deliveries (Dablanc and Ross, 2012). According to Fried and Goodchild's (2023) findings, certain e-commerce courier firms servicing last-mile deliveries opt to be established closer to end-user customers than upstream distribution businesses to improve the time it takes to fulfil customers' time demands. Their study revealed that central location to commercial and industrial areas differs because of fulfilment firms operating requirements, customer base, and launch period of an e-commerce platform. Amazon is the biggest e-commerce firm in the United States of America (USA), and it has expanded its storage warehouse capacity from 836,127 square meters in 2009 to 10,588,253 square meters in 2016 (Kang, 2020). In 2017, online shopping accounted for 8.9% of all market share in revenue in the USA, and this figure is anticipated to continue rising (Maidenberg, 2017). According to Maidenberg (2017), online stores need more warehousing space than storefront shops to manage their stock well and compute orders. In 2017, an additional 20,903,200 square meters of warehouse space was introduced to the logistics industry, this addition was two-fold the aggregate rate of warehousing construction over the previous decade (Kang, 2020). Owed to the contest for land, some prominent logistics firms are proposing the repurposing and refurbishment of the shopping malls that are no longer operational. Malls have direct access to customer markets and other economic infrastructure favourable to logistics, such as airports and highways. Although logistics warehouses and fulfilment centres of online shopping companies have self-operating technology in their premises, they still require the manpower of labourers who pick up, pack, and ship millions of parcels from e-commerce transactions (Hardisty, 2017).

2.3.3 Decentralisation of Delivery

Decentralisation of delivery includes shifts in regulatory frameworks and decentralisation of transport to air and sea. The evolution of logistics concepts delineates logistics markets for distribution areas and consolidation areas. The authors emphasise that the evolution of logistics concepts does not correspond exactly with periods in time because there are firms that are early adopters of change and

some firms still lag behind (van de Lugt and de Langen, 2005). In the 'direct or decentralised delivery' concept there is limited possibility for ports to attract and develop value-adding logistics activities (van de Lugt and de Langen, 2005). Ports can attract distribution operations, however give that distribution is limited to the national economic market, road transport is the prominent mode. Thus, the advantages of ports in terms of transport services by rail, shortsea and inland waterway are not important. As a result, many logistics operations are not established in ports (van de Lugt and de Langen, 2005).

2.3 The Function of Ports in International Supply Chains

Although is an increasing number of papers recognising the importance of ports in global supply chains, (Bichou and Grey, 2005, Robinson, 2006; Panayides and Song, 2009), there have been few studies on how supply chains impact economic activities located near ports. The global economy, shifting consumer habits, and rapid developments in communication, technology, and logistics management have all caused supply chains to change (Kang, 2018; Sakai et al., 2015, Sakai et al., 2017). In order to comprehend how supply chains impact economic activity in the context of Constanta Port, Alexandru (2013) analysed the applicability of both theories. The biggest seaport on the Black Sea, and consequently the largest in the European Union, is Constanta Port. Natural elements including its closeness to the Bosphorus Strait and its link to the Danube, as well as significant expenditures in infrastructure projects, contributed to its development (Alexandru 2013).

2.4 Locational Decisions of Logistics Firms

2.4.1 Business Performance and Integration to Ports and Commercial Areas

According to Robinson (2002), ports are considered integrated components of value-driven chain systems. This is because ports are critical components of global supply chains, businesses based in ports are essentially reliant on the operations of the networks to which they belong. The degree to which various industries integrate inside businesses and within ports is influenced by the integration of ports within supply chains, which affects transport integration and port performance (Ducruet and van der Horst, 2009; Alexandru, 2013; Oni *et al.*, 2024). Liedholm (2002) examined the factors influencing the success and increase of small businesses in Africa and South America. The findings of Liedholm's (2002) study showed that the location of the firm was an important factor. Businesses situated in cities and commercial zones were more likely to be successful, in a particular year, as compared those established in the hinterland and non-urban areas. Urban and commercial location was also associated with faster growth, in terms of the number of employees hired in a given year (Sefiani, 2016). Many studies have validated the role of location in business output (Liedholm, 2002; Harabi, 2003). Dahlqvist et al. (2000) presents that the geographic area, where a business is situated, has ramifications for its link to customers, finance, skilled workers, sub-contractors, infrastructure, and other relevant equipment.

2.4.2 Role of Transport Infrastructure

2.4.2.1 Accessibility for Logistics Firms

Given that the function of logistics is to control the flow of materials, accessibility to transport infrastructure (such as an airport or seaport) may be an essential element when firms make location choices (Alexandru, 2013). Transportation conditions, including accessibility to/from warehouses and infrastructure for delivering goods, significantly influence location choices for logistics firms near ports (De Oliveira *et al.*, 2020; Sakai, 2020). Transportation and lead time are affected by the distance between industrial locations and ports. When choosing a location, a position near the port or airport will typically be given precedence (Chang and Lin, 2015). Logistics companies that deal with container transportation will place a larger value on port infrastructure and access by multiple modes of transport than those that have none. This is because these companies are typically more globally orientated. Since most pallet transportation is done by road, businesses that specialise in that type of transportation will place a higher importance on road accessibility (Verhetsel *et al.*, 2015). Logistic economic operations need to be established in a central locality to receive and deliver products in a less expensive way (Verhetsel *et al.*, 2015). As transportation by road is the main mode for haulage, the accessibility of a business operation by road is often the most relevance in the decision process (Verhetsel *et al.*, 2015).

According to Skender (2016), logistics firms play an important role in container depots in facilitating export and import activities, providing storage, maintenance and repair services for managing the flow of goods in busy ports. Skender (2016) discusses the importance of various logistics services providers, including warehousing firms, freight companies, distributors, and couriers, highlighting their roles in facilitating international trade by managing storage, transportation, and last-mile delivery, thus enhancing supply chain efficiency and connection. According to Skender (2016) logistics middlemen and service providers, as opposed to the transport services, are responsible for the spatial movement of goods in time and for other related operations. According to Schramm (2012) this category includes terminal operators (at seaports) and ground handlers (at airports), public or private warehouses as well as export packaging firms are also included because they are responsible for appropriate packaging and the arrangement of goods in containers before their movement. Third-party logistics providers and fourth-party logistics providers integrate all of the abovementioned services (Domingues *et al.*, 2015). Third-party logistics mostly handle basic logistics activities and can be valuable in developing a customer's supply chain (Domingues *et al.*, 2015). Third-party logistics' growing importance worldwide allows the provision of fast pace services of various services to firms from all sectors to encourage them to reduce costs, focus on their differentiating function and subsequently to enable them to attain higher output (Domingues *et al.*, 2015).

Numerous studies have explored the correlation between port-hinterland transport, a firm's location, and its performance. Sefiani *et al.*'s (2016) study on Tangier's SMEs found that location significantly impacts their success. Their study relied on semi-structured interviews with selected owners and managers, considering factors like sector and region. The findings highlight the importance of business location in Tangier, Morocco; an important port and economic centre (Sefiani, 2016). Warehouses have been concentrated in areas with strong freight sector enterprises, a growing

population, and a wealth of transportation infrastructure, according to the research (Van den Heuvel et al., 2013).

2.4.2.2 Accessibility Broader Urban Structure and Labour Force

Logistics firms tend to locate closer to highways and other transport infrastructure, with a trend towards suburban and extra-urban locations with good accessibility. However, central cities have experienced a declining share of logistics firms (Holl and Mariotti, 2017). Accessibility to population and the designation as specialised economic activity/logistics zones also influence the location choices of logistics facilities near ports (Sakai, 2020). Customer demand and service level are identified as important factors influencing the spatial distribution of logistics firms near ports (Onstein *et al.*, 2019). All the inputs of facility and labour force stipulations have ramifications for differential location decisions to establish in particular space (Kang, 2020). Thus, it is important for planners and policymakers to clearly understand and prepare necessary policies for the future demand of warehousing space, location, and operations. In relation to population density, employment density, and access to the workforce, the selection of location shows no distinction based on facility size during the periods of 1951–1980 and 1981–2000 (Kang, 2020). In contrast to the baseline, medium-sized warehouses constructed between 2001 and 2016 are significantly more susceptible to the adverse relationship with population density (Kang, 2020). Conversely, the strength of the positive correlation with employment density has decreased over time, particularly regarding large warehouses from 2001 to 2016 (Kang, 2020). Potential reasons include that a regional goods distributor may not need direct access to a local market and that the intense demand for land near employment subcentres may not be conducive to land-heavy operations. Moreover, travel time to seaports remains a significant negative factor for large warehouses across the periods, with this effect intensifying considerably over time. This may not imply that seaports have lost their significance for the warehousing sector, but rather that the Port of Los Angeles/Port of Long Beach complex is situated adjacent to central urban areas in the case study (Kang, 2020).

2.5 Types of Logistics Firms

The types of economic activities specific to ports are classified according to de Langen's (2004) proposed model, which separates them into cargo handling, warehousing, transport, logistics, manufacturing, and trading (Alexandru, 2013). From the case of Constanta Port, cargo handling activities making up 25% of companies licenced for cargo handling activities were the most important because they connect the various modes of transport served by the port in question, becoming in this way the key activity of any port (Alexandru, 2013). There are many more types of firms however, it would be nearly impossible to present a comprehensive list of port functions due to their wide range of scope and types and thus classification should be simplified in terms of channels that serve port functions (Bichou and Grey, 2005). Governmental and international organisations like the World Bank Group (2001) and the US Maritime Administration (1978, 1999) produced a large portion of the literature on port functional duties (Bichou and Grey, 2005). The majority of logistics channels are made up of port functions such as shipping lines and freight forwarders; who make it easier for cargo to move through various processes, such storage and transportation. The phrase "supply chain

management" is commonly used due to the focus on the company level, but other terms including "network sourcing," "supply pipeline management," "value chain management," and "value stream management" are also occasionally used (Croom et al., 2000). With the growing understanding of the integrative role that ports play in global logistics and distribution networks, there has been some interest in conceptualising ports using a channel approach in recent years. According to Robinson (2002), ports are essential components of value-driven chain systems. According to Robinson (2002), ports support supply chains by generating competitive advantage and delivering value-added products. Although it only includes the logistics channel, his model of the port value chain shows a variety of relationships and flows in a typical port organisation, from highly fragmented systems of shipping lines, shipping agents, customs agents, freight forwarders, etc. to a fully functionally integrated system under the control of mega-carriers (Bichou and Grey, 2005). According to Paixao and Marlow (2003), ports ought to take a more active role in the supply chain by adding a new dynamic and agile dimension. While Carbone and De Martino (2003) evaluated a port operator's contribution to a user's supply chain by utilising Lambert's (2001) tri-dimensional model based on supply chain structure, business processes, and management, while Bichou and Grey (2005) created a model for measuring port performance by conceptualising ports from a logistics and supply chain management approach depicted below:

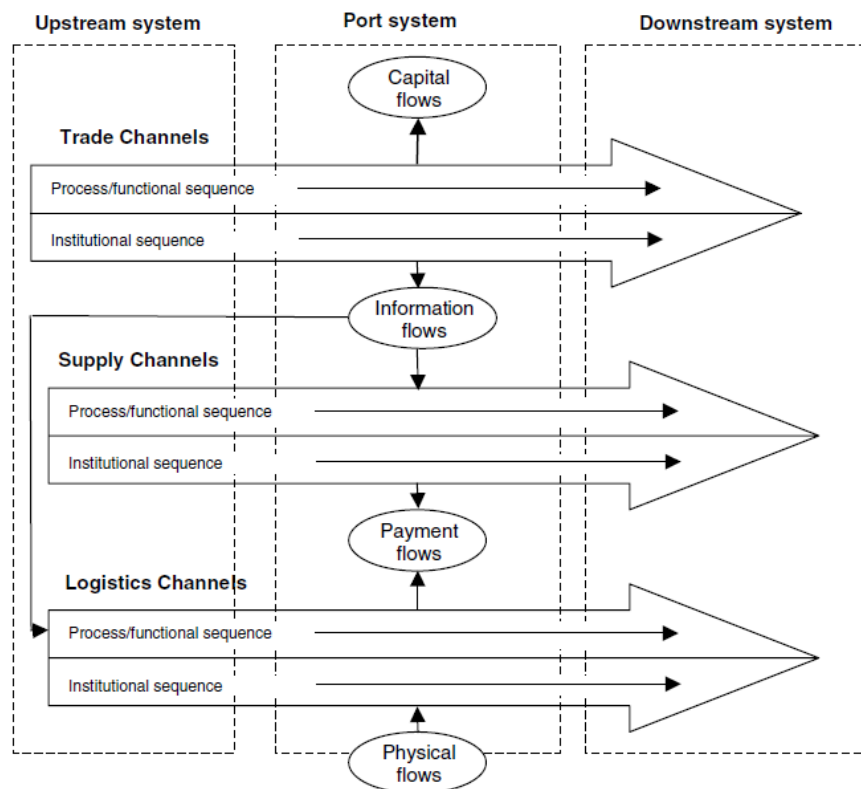


Figure 2.1: A framework for managing and operating ports (Bichou and Gray, 2005: 88).

2.6 Spatial Distribution of Logistics Firms

2.6.1 Spatial Concentration of Logistics Firms

Longitudinal empirical data on logistics establishments in a Dutch province show that logistics activities spatially concentrate in specific areas, with larger logistics establishments and transport establishments locating in emerging agglomeration areas (van den Heuvel *et al.*, 2013). The geographical features and network structures of coastal port logistics have been studied, showing the evolution and maturation of logistics network business establishments over time (Alexandru, 2013; Guo and Qin, 2022). Spatial distribution of the facilities in the Los Angeles Combined Statistical Area (CSA) (Kang, 2020). The Inland Empire areas (Ontario-Riverside-San Bernardino), the Port of Los Angeles/Port of Long Beach, the old industrial areas close to the central business district of Los Angeles, and several remote locations along the highway network (Oxnard, Santa Clarita, Moreno Valley, and Palm Springs) are where warehouses are comparatively concentrated. Ports have developed into places of high concentration of diverse complementary economic activity. The development of specialised activities pertaining to the processing of passengers and commodities is the main cause of the concentration of economic activity also referred to as agglomeration. (Alexandru, 2013). A port's geographical location and provision of specialised infrastructure facilitate the development of industrial concentrations (Alexandru, 2013). In order to take advantage of potential agglomeration effects, logistics enterprises will likely value greater multimodal accessibility more than the former and will likely favour a position in a business park (Verhetsel *et al.*, 2015).

The economic agglomeration of a port is influenced by the integration of companies into international supply chains, leading to internal and external economies of scale, scope, and complexity (Verhetsel *et al.*, 2015). Agglomeration factors, such as the presence of other logistics enterprises and regional balance, play a significant role in the spatial distribution of logistics firms near ports (De Oliveira *et al.*, 2020; Sakai, 2020; Onstein *et al.*, 2019). Spatial clustering of logistics firms near ports significantly increases inter-firm competitive rivalry, particularly enhancing the bargaining power of buyers and indirectly affecting competitive rivalry through threats of substitutes (Oni *et al.*, 2024).

2.6.2 Reliance on Operation of Networks

A paradigm shift occurred in the roles that ports, which are viewed as clusters of specialised economic activities, fulfil in light of the deterritorialization/decentralization of production activities (Scholte, 2000) that has taken place over the past 20 years, as well as the unprecedented growth in the flows of goods, services, and knowledge as well as the mobility of people (Alexandru, 2013). As a result, value-driven chain systems started to view them as interconnected components (Robinson, 2002). Companies situated in ports play a crucial part in international supply networks, becoming essentially reliant on the operations of the networks to which they belong (Alexandru, 2013). The focus of analysis of logistics firms has shifted from the enterprises in the system to the system of firms in the case of port economic agglomerations. (Alexandru, 2013). As a result of the shift in focus from the firms in the system to the system of firms, enterprises no longer compete with one another as distinct entities but

rather inside the supply chain (Bichou and Grey, 2005;). Because each actor's performance makes the system more competitive, the logic of this situation leads to systems with the best integrated actors capturing an increasing amount of freight volumes. Both the internal and external economies grow as captured freight volumes increase. Agglomeration economies and dispersion economics are two significant drivers shaping the location of logistics firms (Polenske, 2006). On the one hand, there is the port economic agglomeration, which is made up of businesses that often profit from the public capital found in port infrastructure and produce both internal and external economies through the agglomeration's mechanisms. On the other hand, there are businesses that are organised as networks and are centred around private capital, which aims to increase the value of the final consumer in order to gain access to the organised networks of firms (Alexandru, 2013).

2.6.3 Port-centric Logistics Clusters

In order to smoothly integrate geographically dispersed supply chains, port logistics clusters (PLCs) are becoming more and more global, strategically interconnected, and functionally nodal (Singh, 2022). According to Sheffi (2013), logistics clusters are geographical groups of related and dependent logistics companies that work together and compete in the globalised market. In order to benefit from location-based advantages along important trade routes, logistics companies have been able to move closer to important intermodal hubs and growth centres as a result of globalisation and the resulting geographic dispersion of manufacturing activities (Singh et al, 2022). PLCs are spatial agglomerations of logistics-related companies, connecting national economies with global production networks (Oni et al., 2024). These clusters offer benefits such as agglomeration economies, increased competition, access to a larger customer base, skilled labour availability, and enhanced inter-firm interactions (Oni et al., 2024). Port-centric logistics clusters are spatial agglomerations of interconnected logistics firms, facilitating international trade and economic development (Singh et al., 2022). PLCs are seen as intermodal gateways that link international industrial networks with national economies. The corporate environment has an impact on the clusters, which have different spatial features. There is proof that the concentration of logistics companies near ports creates port-centric logistics clusters, which influence competitive rivalry and promote economic agglomeration. The spatial concentration of logistics employment in particular places is also demonstrated by the location dynamics of logistics establishments (Singh et al, 2022). Globally, there are thousands of thousands of logistical clusters. They go by several names around the world, including "Logistics Platforms" in Spain, "Logistics Villages" in Germany, and "Distribution Parks" in Japan (Sheffi, 2013). By integrating the local market with international production networks, this spatial clustering of logistics services improves operational efficiency (Chhetri et al., 2014). Sheffi (2013) noted that this conduct occurs when businesses operate in close proximity to important transportation hubs, like ports, airports, and significant rail or road networks. Due to intense inter-firm competition and cooperation, this spatial layout may result in increased productivity, innovation potential, and operational efficiencies (Chhetri et al., 2014; Rivera et al., 2014; Singh et al., 2016). But when it comes to ports, there isn't much empirical evidence to back up this claim (Singh et al., 2022).

2.6.4 Competition and Collaboration between Firms

Factors contributing to port logistics competitiveness include the use of the fourth industrial revolution technology in port logistics and the transformation of ports into integrated parts of supply chains (Ducruet and van der Horst, 2009; Alexandru, 2013; Singh *et al.*, 2022). According to Porter (1998), the coexistence of inter-firm competitive competition and collaboration is encouraged by the spatial clustering of enterprises. In an atmosphere characterised by fierce inter-firm competition and cooperative behaviours, co-location makes businesses more competitive. The majority of research has focused on the advantages of collaboration, such as providing value-added services, career mobility, trust-building, and resource and information sharing (Li and Geng, 2012; Rivera, 2014; Rivera *et al.*, 2014), despite the presumption that localisation fosters both inter-firm collaboration and competition (Singh *et al.*, 2022). In contrast, competitive rivalry has been largely ignored until recently. There is currently very little research that examines the intricacy of competitive rivalry amongst logistics companies that rely on ports (Singh *et al.*, 2022). The findings of the Port of Melbourne study show that when logistics companies are geographically grouped together, inter-firm competitive competition rises noticeably. When they congregate near the port, this effect is amplified. Co-locating businesses close to the port tends to give buyers more negotiating leverage while also subtly influencing competitive competition through the prospect of replacements. This suggests that by increasing the availability of alternative services, co-location strengthens buyers' bargaining power and encourages competitive rivalry amongst businesses (Singh *et al.*, 2022). Porter's cluster and five forces models are validated in the study, confirming PLCs have a favourable impact on buyers' bargaining power and an indirect influence on competitive rivalry that is partially mediated by threats of replacements (Singh *et al.*, 2022). Because port infrastructure is fixed, a port's competitive advantage comes from the benefit it creates for both those who transit their commodities via it and those who offer a range of services for goods in transit (Alexandru, 2013). In other words, a port will have a competitive edge as long as shippers and those who supply them with the services they require will add value to their activities using that port. Therefore, a port's competitive position is influenced by its component actors' relationships on a particular supply chain as well as its internal capabilities (effective products transfer, hinterland linkages, and a wide range of services).

2.7 Role of Land-Use Planning and Regulation

2.7.1 Policies and Plans

Shifts in supply chains processes are not only a result of decisions at firms but they are affected by government land use policies and local availability of resources (Guerrero and Proulhac, 2014; Xiao *et al.*, 2021). Xiao *et al.*'s (2021) case study findings showed notable concentration of logistics facilities was evident in central areas, particularly along the primary corridor connecting Shekou Port in the west to Yantian Port in the east. Specifically, several significant logistics clusters emerged along the freight railways and major freeways was influenced by policies and regulations in addition to other economic factors. Figure 2.1 below illustrates key determining factors that influence the distribution of logistics facilities in cities. The case study of Shenzhen found that the Urban Development and Land Use Plan for 2016-2020 encouraged high intensity of logistics land uses and shared infrastructure

services in certain planned districts this included the use of financial incentives and land use planning facilitate logistics, a proposed strategy centred on e-commerce and urban logistic networks (Xiao et al., 2021). In the long run land use planning encouraging high intensity of logistics land uses can cause irreversible damage to the environment's air quality, impact of waste generation and traffic volumes and thus requires diligent environment evaluation reviewing of policy options.

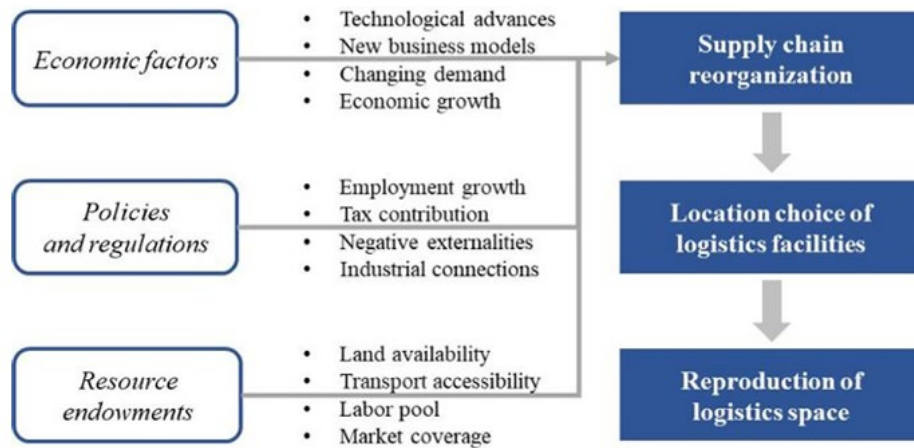


Figure 2.: Key determining factors that influence the distribution of logistics facilities in cities (Xiao et al., 2021:2)

The environmental impact is a growing concern in many logistics clusters (van den Heuval et al., 2013). Van den Heuval et al.,'s (2013) study examined the land allocation policies of municipalities in the southern Netherlands. The objectives were to determine whether municipalities possess a vision to encourage the spatial concentration of logistics firms, to assess whether municipal employees are aware of the impacts of this concentration, and to ascertain their willingness to collaborate with other municipalities to promote the spatial concentration of logistics firms further (van den Heuval et al., 2013). The study revealed that municipalities recognise that the co-location of logistics establishments can yield both firm-specific and societal benefits and the authors assert that the spatial concentration of logistics firms results in greater consolidation of transport flows, enhanced collaboration between logistics education institutions and the logistics sector, and increased attractiveness of the southern Netherlands as a hub for logistics firms. Cooperation among municipalities appears to be an effective strategy to address drawbacks of intensity of logistics land use because the collaborating municipalities can opt to promote the development of logistics concentration areas in a limited number of locations, thereby necessitating additional infrastructure investments only in those municipalities (van den Heuval et al., 2013).

2.7.2 Special Economic Zones

The establishment of Special Economic Zones (SEZs) significantly influences port development by creating conducive environments for trade and logistics. SEZs typically offer streamlined regulatory frameworks and fiscal incentives, attracting businesses and fostering economic activity that enhances port utilization (Ruocco, 2023). Within these zones, improved infrastructure such as road networks,

rail connections, and port facilities accelerates the movement of goods, thereby facilitating international trade (Li and Wang, 2021). The proximity of manufacturing units to ports reduces transportation costs and time, aligning with principles of efficient supply chain management. The interaction between SEZs and port development is thus mutually beneficial: while SEZs thrive on enhanced port activities, ports leverage the influx of investment and operational efficiency derived from these zones (Ruocco, 2023).

In numerous developing countries, SEZs can manifest in various forms, such as industrial parks or integrated logistics hubs and have become essential instruments for promoting economic growth (Li and Wang, 2021). Presently, the prevalence of industrial parks and SEZs is on the rise in Southeast Asian nations, as well as in regions of Africa and Italy in Europe. An increasing number of countries are either establishing new frameworks for special economic zones or updating existing ones in response to the growing interest in zone-based development plans worldwide (Li and Wang, 2021). Nations such as Japan, China, and Singapore have successfully established SEZs and industrial parks in several Southeast Asian countries (Crane et al., 2018; Haung et al., 2017). While SEZs are frequently highlighted in contemporary literature as a means of stimulating investment and economic growth, they also play a significant role in urban planning and land use activities (Arbolino et al., 2022).

The case study of SEZs in Campania, Italy, shows their vital role in enhancing port accessibility and fostering economic growth within the region (Ruocco, 2023). By strategically integrating land use planning with transportation infrastructure, SEZs support regional logistics and industrial development, thereby attracting both domestic and international investments (Li and Wang, 2021). Thus the establishment of SEZs can transform these limitations into strategic opportunities, promoting targeted investment in transport infrastructure and incentivizing businesses to optimize their supply chains. By fostering an environment conducive to international trade through streamlined regulations and modern logistics services, SEZs can enhance the functional efficiency of port regions (Ruocco, 2023).

SEZs offer significant economic opportunities through enhanced regulatory frameworks that attract foreign investment and foster industrial growth. However, for these zones to reach their full potential, future land use planning must prioritise strategic infrastructure developments, such as efficient access routes and multimodal transport systems, given the risks of high traffic volumes and environmental concerns as discussed in section 2.6.1. Therefore sustainability considerations must be at the forefront, ensuring that economic pursuits do not compromise environmental integrity. The implications of these findings suggest that policymakers should adopt a holistic approach, aligning land use strategies with broader economic and social goals while continuously engaging stakeholders.

The logistics industry is regulated by the government in China (Alexandru, 2013). The degree of regulation differs across cities and changes over time. Thus, government policy is a critical factor that may influence the location of logistics firms. Ports are possible sites for central distribution hubs, which represent another change in logistics principles (van de Lugt and de Langen, 2005). This is demonstrated in Europe by the fact that a significant portion of the European (central) distribution centres (EDC) created in Europe have been drawn to the port of Rotterdam (van de Lugt and de

Langen, 2005). Other ports have also developed strategies to attract "central distribution facilities" in Antwerp, which affords location advantages comparable to those of Rotterdam, Barcelona, where a large distribution zone was developed and a "dry port" in Southern France was opened, Panama, where large logistics zones are developed, and Jebel Ali, where a "free trade zone adjacent to the port was developed and has attracted a substantial number of global logistics service providers" (van de Lugt and de Langen, 2005). Free zones (FZs) and Special Economic Zones (SEZs) have played a crucial role in boosting trade and realising economies of scale. Furthermore, as trade and supply costs are reduced within FZs and SEZs, the initial capital required to establish a trading business is lower. These factors represent just a few of the many ways in which FZs and SEZs significantly contribute to the implementation of government policies and economic development.

According to Ruocco 2023, in the Campania region, investments made in SEZs for genuine foreign investors have been accompanied by various incentives: (1) Labour: One major incentive for establishing a presence in SEZs is the availability of a large workforce, further supported by tax breaks; (2) Land Use: SEZs were strategically designed as planned entities, complete with infrastructure and access to a container port complex, allowing for easy transport of components and raw materials for processing and subsequent shipment of finished products to international markets; (3) Tax Incentives: SEZs provide a reduced corporate income tax rate, along with income tax exemptions for certain companies based on their production levels and operational strategies (Ruocco, 2023). These incentives influence logistics firms' locations. SEZs thus have a direct impact on land use.

2.8 Policy and Legislation

2.8.1 Global Trends in National Policies for Ports

Some national port legislation has yet to adapt to contemporary challenges (Inter-American Committee on Ports, 2017). Therefore, a reformed or new regulatory framework is required to enhance port terminal efficiency and competitiveness. New regulatory framework should incorporate enhanced consultation processes, involving the private sector in procurement, the development of new port regulations, and the granting of concessions and permits. It is recommended that consultation processes must encompass all stakeholders involved in port management at national, local, and community levels, and include robust monitoring and evaluation mechanisms (Inter-American Committee on Ports, 2017). Efficient maritime transport is crucial for economic growth, with reduced transportation costs demonstrably stimulating industrial development, attracting investment, and boosting GDP thus, many governments are actively pursuing policies to further reduce costs and improve maritime transport system efficiency (Rahayu et al., 2024). However, these efforts have been hampered by external factors, such as the recent global pandemic and the war in Ukraine (Rahayu et

al., 2024). There is a prevalent focus on the physical infrastructure, particularly port efficiency and technological advancements, often overshadows other essential policy considerations (Rahayu et al., 2024).

Despite the intrinsically global and interconnected nature of maritime transport, encompassing both the Global North and South, existing research on port policy and governance disproportionately focuses on the Global North, often overlooking the experiences and challenges of the Global South (Wilmsmeier and Monios, 2020). Many port studies on the global south reflect on port performance at many African ports that threatens to stifle future economic growth and investment required for port terminal infrastructure, improved port access, interconnected infrastructure, and efficient operations are crucial for meeting current and future demand, reducing transport costs, and boosting the efficiency and reliability of freight logistics (Mlambo, 2021). In seaport literature, port performance is found to be pivotal in facilitating trade and the specialization of economic activities for city and regional economic development (De Langen 2004; De Langen and Haezendonck 2012). Port planning, development, policy, regulation, competition, and competitiveness have been extensively researched (Notteboom et al. 2013; Woo et al. 2011). Literature that focuses policies of ports adjacent to cities focuses on integration and governance which acknowledges other stakeholders in the city adjacent to ports. Research indicates that applying multiple, disparate governance models within a single maritime transport system can create significant challenges. Trein et al.'s (2019) integration and coordination of public policies framework focuses on the degree of integration and coordination. Integration, encompassing the unification of elements into a cohesive whole, is crucial in maritime transport for optimising competency sharing, operational efficiency, and supply chain effectiveness (Rahayu et al., 2024). Policy goals and instruments have various dimensions, vertical (across government tiers), horizontal (across departments/sectors), spatial (across regions), and temporal (across timeframes). Coordination, conversely, focuses on enabling separate entities to collaborate effectively (Trein et al., 2019). In logistics and maritime transport policy integration and coordination involve facilitating communication and interaction between stakeholders, fostering cooperation in the context of interdependent actors within maritime logistics chains (Rahayu et al., 2024).

2.8.2 South African Legislation and Policy related to Ports

The Constitution of South Africa outlines the legislative responsibilities of various levels of government in relation to airports, road infrastructure, rail, maritime, road traffic management, and public transport. The function of transport is legislated and carried out at national, provincial, and local government levels. At the national level, the implementation of transport functions is managed by public entities supervised by the Department of Transport (DoT), each with a defined delivery mandate specified in the legislation that established these entities. The 1996 White Paper on Transport highlights and defines the infrastructure and operations concerning rail, pipelines, roads, airports, harbours, and the intermodal operations of public transport, maritime transport and freight. Ports are intermodal operations of maritime transport and freight. The DoT is tasked with executing the legislation and policies relevant to these subsectors by conducting sector research, developing legislation and policy to guide strategic direction, assigning responsibilities to public entities and different government levels, regulating through the establishment of norms and standards, and monitoring implementation.

The Ports Regulator is established under section 29 of the National Ports Act (Act 12 of 2005) and functions as a public entity that provides reports to the Minister of Transport (Republic of South Africa, 2005). Its primary responsibilities include overseeing the economic regulation of the ports system to align with government strategic goals, promoting equitable access to ports and the facilities and services they offer, monitoring the Transnet National Ports Authority Transnet to ensure compliance with the Act, and addressing appeals and complaints (Republic of South Africa, 2005). In addition to assessing the proposed tariffs of the Transnet National Ports Authority, the Ports Regulator aims to foster regulated competition and ensure the provision of adequate, affordable, and efficient port services and facilities (Republic of South Africa, 2005). Guided by various government programs, the Ports Regulator works towards enhancing price and operational efficiencies within South Africa's commercial ports (Ports Regulator of South Africa, 2023). This effort supports the broader national objective of reducing transport costs and enhancing the country's competitiveness within global supply chains (Ports Regulator of South Africa, 2023).

The Ports Regulator's mandate is supported by a collection of statutory and policy instruments, which include key documents such as the White Paper on Commercial Ports (2002), the Comprehensive Maritime Transport Policy (2017), and the National Ports Act (Act 12 of 2005), along with subsequent regulations and directives (Ports Regulator of South Africa, 2023). Its procedural and substantive authority also derives from various other pieces of legislation, including the Constitution of the Republic of South Africa (Act 108 of 1996), the Basic Conditions of Employment Act (Act 75 of 1997), the Employment Equity Act (Act 55 of 1998), the Labour Relations Act (Act 66 of 1995, as amended), the Public Finance Management Act (No. 1 of 1999, as amended), and several strategic frameworks and plans, including the National Development Plan and Government's Oceans Economy Strategy (Ports Regulator of South Africa, 2023).

Transnet National Ports Authority (TNPA) is tasked with ensuring the safe, efficient, effective, and economical operation of South Africa's national ports system. South Africa's economy is transitioning from one primarily reliant on the extraction and sale of natural resources to a focus on manufacturing and services. This shift has led to an increasing dependence on port facilities for the export of processed goods. A significant portion of the country's coastal development is centred around the eight major commercial ports located at Saldanha Bay, Cape Town, Mossel Bay, Ngqura (Coega), Gqeberha (Port Elizabeth), Buffalo City (East London), eThekweni (Durban), and Richards Bay. These ports serve as focal points for government initiatives such as the Spatial Development Initiatives (SDIs). Acting on behalf of the Government, TNPA manages, controls, and administers the port infrastructure and marine services across all eight fully operational commercial ports in the country. Transnet is structured into two primary operational areas: port infrastructure and maritime operations. These operations encompass dredging, navigation aids, ship repairs, and various marine activities, which are offered across five market segments: containers, dry bulk, liquid bulk, break-bulk, and automotive. Major commodities handled at the ports include coal, iron ore, containers, automobiles, steel, fruit, ferrochrome, petroleum products, and manganese. Established as a landlord port authority under the National Ports Act (No. 12 of 2005), TNPA plays a crucial role in the management of South Africa's commercial ports.

In March 2009, Port Rules were introduced according to the National Ports Act, and a National Ports Plan for South African commercial ports was developed by TNPA, with updates made in 2019. In 2017, the South African government adopted the Comprehensive Maritime Transport Policy (CMTP), which acknowledges existing policies and legislation related to commercial ports while aiming to enhance and review these frameworks in the future. The South African Maritime Safety Authority (SAMSA) has introduced the Vision 2030 strategy, which seeks to further South Africa's aspiration of becoming an International Maritime Centre. This initiative aligns with broader continental goals, such as Agenda 2063 and the aspirations outlined in the Africa Integrated Maritime Strategy 2050 (AIMS2050). Additionally, it supports national priorities, including the National Development Plan and the government's Ocean Economy ("Blue Economy") programme, known as Operation Phakisa. Operation Phakisa is a government initiative aimed at unlocking South Africa's ocean economic potential, which is expected to benefit from the implementation of this maritime policy. South Africa's Blue Economy focuses on four key areas: marine transport and related manufacturing; offshore oil and gas; aquaculture and marine conservation; and effective ocean governance. Through this strategy, SAMSA aims to play a vital role in enhancing the maritime sector's contribution to the nation's economic growth and development.

The South African Shipping Company Bill, 2022, aims to establish a national shipping company (SASCO) to address South Africa's dependence on foreign-owned vessels for the carriage of its exports and imports. The Bill outlines the company's establishment as a juristic person, with the Minister of Transport as the sole shareholder representing the State. It details the company's objectives, including participation in the carriage of exports and imports, ownership and management of a strategic fleet of vessels, promotion of shipping research and innovation, and provision of related logistics services. The impact of the South African Shipping Company Bill, 2022 logistics and spatial economic dynamics in the logistics and port cities in South Africa is yet to be observed.

3.6.3 Spatial Planning and Land Use Management Act

The Spatial Planning and Land Use Management Act (SPLUMA) of South Africa significantly impacts land use planning in South African cities. SPLUMA aims to create a more integrated and efficient system for managing land, moving away from fragmented and often conflicting approaches. For cities, SPLUMA provides a framework for strategic spatial planning, promoting integrated development and addressing issues like housing shortages and infrastructure provision. The Act's emphasis on integrated planning influences how cities consider land use for various purposes, including housing, infrastructure, and transport. In the context of ports, SPLUMA's relevance applies to facilitating the coordinated development of port-related infrastructure and activities through the provisions of spatial development frameworks. Spatial development frameworks allow for the integration of port expansion plans with broader urban and regional development strategies, promoting efficient land use and reducing conflicts between port operations and surrounding communities. SPLUMA also provides planning principles that can be applied to port development such as environmental sustainability and social equity. The successful implementation of SPLUMA's vision requires effective coordination

between various government sphere, stakeholders and port-related policies mentioned in section 3.6.2 remains a challenge.

2.9 Summary

The purpose of this chapter was to synthesise literature in logistics activities in the vicinity of ports, the crucial functions of ports within global supply chains, and the integration of these elements within broader economic contexts. Key findings indicate that logistics activities are increasingly influenced by globalisation, with ports transitioning from traditional distribution hubs to integrated logistics centres that support both national and international supply chains. The chapter also highlighted the duality in port-related distribution, where some activities migrate inland due to congestion and land scarcity at ports, while others remain reliant on port infrastructure. The significance of factors such as cost of land, accessibility to transportation infrastructure, and evolving e-commerce demands are also underscored as critical determinants in the location choices of logistics firms. Overall, this review accounted for the dynamic relationship between ports and logistics, providing foundational insights that inform ongoing research and decision-making in the field of supply chain management. The emergence of port-centric logistics clusters demonstrates the importance of proximity to ports for enhancing operational efficiencies and competition among firms. The following chapter builds on the emerging trend of port-centric logistics clusters. The theoretical framework in the next chapter is thus based on Cluster Theory and its applicability to the development and trends of economic activity in the vicinity of ports.

Chapter 3: Theoretical Framework

The previous chapter provided the theoretical review for the study. The purpose of this chapter is to provide a foundation for understanding the historical evolution of cluster theory and its contemporary applications in the context of ports. This chapter draws from the key findings in the literature concerning agglomerations and port-centric logistics clusters. This study uses port cluster theory in the context of the case of Paarden Eiland located in the vicinity of the Port of Cape Town to provide empirical evidence on the dynamics of marine agglomerations and clusters. This theoretical framework is significant in the study of maritime clusters and their significant role in port development and logistics. It emphasises how geographic proximity and interconnectedness among firms and institutions can enhance competitive advantage and foster innovation, thereby influencing regional and national economies. The structure of this chapter first begins by establishing the historical context and evolution of cluster theory, beginning with Alfred Marshall's seminal work on industrial districts and leading to modern interpretations (Section 3.1). Secondly, the chapter analyses the concept of geographical clusters, highlighting their impact on firm performance, knowledge sharing, and competitive dynamics (Section 3.2). Thirdly the chapter discussion focuses on Michael Porter's cluster theory, wherein clusters produce synergies among interconnected firms and institutions, particularly within port development (Section 3.3). Fourthly it provides an overview of maritime clusters and their strategic importance to business operations and national economies (Section 3.4), followed by an exploration of port regionalisation and spatial economic planning, detailing how port activities extend beyond traditional limits to integrate with inland logistics systems (Section 3.5). Lastly, the chapter summarises the key points (Section 3.6).

3.1 Historical Context and Evolution of Cluster Theory

Cluster theory provides a robust lens for examining port development and maritime clusters. As defined by various scholars, clusters represent geographic concentrations of interconnected firms and institutions, fostering competitive advantages through proximity and collaboration (Porter, 1998). The origins of cluster theory can be traced back to Alfred Marshall's analysis of industrial districts in the 19th century. Marshall identified the benefits of geographic concentration, where industries within the same location could capitalise on shared infrastructure, specialised labour, and knowledge spillovers (Marshall, 1890/1920 cited in Martin & Sunley, 2003). This laid the groundwork for modern cluster theory, which emphasises the interconnectedness of firms and institutions in specific geographic regions (Martin & Sunley, 2003). In his analysis, Marshall emphasised how geographic concentration of firms creates unique external economies, fostering innovation and competitiveness. According to Marshall, the key components of an industrial district include a skilled labour pool, specialised suppliers, and an environment conducive to the spread of tacit knowledge, which he famously described as "being in the air" (Belussi & Caldari, 2009). This atmosphere of collaboration and competition allows districts to benefit from synergies between firms, promoting both economic efficiency and innovation. Marshall's study of industrial districts of Lancashire, with its concentration of

cotton mills and engineering industries, illustrate how such clusters can drive local economic development by pooling resources, knowledge, and skills within a defined geographical area. These principles remain central to contemporary understandings of clusters, particularly in the context of port development, where maritime clusters enhance logistics, competitiveness, and regional integration. Marshall's studies on external economies such as minimising transit costs, fostering a specialised labour force, and promoting collaboration underpins the concept of industrial localisation (Marshall, 1920 cited in Martin & Sunley, 2003). His insights on knowledge spillovers, where business secrets become "no mysteries" within clusters, continue to inform modern cluster discussions (Marshall, 1890 cited in Martin & Sunley, 2003).

3.2 Geographical Clusters

The significance of geographical clusters has garnered considerable attention in various studies investigating the influence of location on firm performance (Sefiani et al., 2016). Some research indicates that companies situated in local or regional agglomerations tend to outperform those located in non-clustered areas, suggesting that the benefits of clustering can enhance competitive advantage (Baptista and Swann, 1998; McCann & Folta, 2008). Conversely, other studies point to potential downsides associated with clustering, such as increased competition among firms and the risk of knowledge leakage (Sefiani et al., 2016).

Birkinshaw and Hood (2000: 142) define clusters as "an aggregation of competing and complementary firms that are located in relatively close geographical proximity." Tallman et al. (2004) expand on this definition by emphasising the importance of social networks, describing a cluster as "a group of firms tied together by geographical co-location and complex social interaction." Such proximity fosters the flow of knowledge (Alemeida and Kogut, 1999) and resource mobilisation (Stuart and Sorenson, 2003), which can positively impact firm performance (Porter, 1998; Cooper & Folta, 2000; Folta et al., 2006).

In the context of Tangier, the establishment of free zones has created distinct dynamics whereby firms can be categorised as either inside or outside these zones, resulting in significant implications for knowledge sharing and collaboration (Sefiani et al., 2016). The foundational aspects of knowledge transfer and collaboration often rely heavily on the nature of relationships among firms within a specific geographical area. This complexity is influenced by both physical proximity and virtual networks. A study conducted by Coenen et al. (2006) reveals that "spatial proximity was appreciated for easing collaboration, but long distance was not seen as a prime obstacle" (Sefiani et al., 2016). Such insights highlight the multifaceted nature of geographic clusters and their impact on business operations.

3.3 Modern Cluster Theory and Port Development

Porter's cluster theory, which defines clusters as geographically proximate groups of interconnected companies, is central to contemporary discussions on economic development (Porter, 1998). The

theory has been embraced by governments and institutions worldwide, including the Organization for Economic Cooperation and Development (OECD) and the European Union, as a key policy tool for regional and national competitiveness (OECD, 2018). Michael Porter's (1998) work on clusters and the new economics of competition emphasises that clusters represent geographic concentrations of interconnected companies, suppliers, and institutions that collectively create competitive advantages through local synergy (Porter, 1998). These clusters extend beyond simple co-location; they encompass an array of entities, including specialised suppliers, educational institutions, and even governmental bodies that provide critical infrastructure, training, and research support (Porter, 1998). The inherent complementarities within a cluster, such as shared inputs, innovation, and joint marketing strategies, lead to greater efficiency and productivity. Clusters also foster innovation by enabling firms to rapidly respond to market changes, benefiting from knowledge spillovers and specialised labour markets. Porter highlights that while global sourcing has reduced some traditional barriers to competition, the enduring competitive advantage lies in local elements such as relationships, expertise, and infrastructure that distant competitors cannot easily replicate. This framework is essential when examining port development, as port clusters function similarly, relying on local synergies to enhance competitiveness and innovation within maritime logistics. The notion of clusters is always growing and being refined in practice. Table 3.1 below refers to additional definitions (Martin and Sunley, 2003).

Table 3.1: Cluster definitions in literature. Adapted from Martin and Sunley (2003: 12).

Porter (1998, 199)	'A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities.'
Crouch and Farrell (2001, 163)	'The more general concept of "cluster" suggests something looser: a tendency for firms in similar types of business to locate close together, though without having a particularly important presence in an area.'
Rosenfeld (1997, 4)	'A cluster is very simply used to represent concentrations of firms that are able to produce synergy because of their geographical proximity and interdependence, even though their scale of employment may not be pronounced or prominent.'
Feser (1998, 26)	'Economic clusters are not just related and supporting industries and institutions, but rather related and supporting institutions that are more competitive by virtue of their relationships.'
Swann and Prevezer (1996, 139)	'Clusters are here defined as groups of firms within one industry based in one geographical area.'

Swann (1998, 1)	'A cluster means a large group of firms in related industries at a particular location.'
Simmie and Sennett (1999, 51)	'We define an innovative cluster as a large number of interconnected industrial and/or service companies having a high degree of collaboration, typically through a supply chain, and operating under the same market conditions.'
Roelandt and den Hertog (1999, 9)	'Clusters can be characterised as networks of producers of strongly interdependent firms (including specialised suppliers) linked each other in a value-adding production chain.'
Van den Berg, Braun and van Winden (2001, 187)	'The popular term cluster is most closely related to this local or regional dimension of networks . . . Most definitions share the notion of clusters as localised networks of specialised organisations, whose production processes are closely linked through the exchange of goods, services and/or knowledge.'
Enright (1996, 191)	'A regional cluster is an industrial cluster in which member firms are in close proximity to each other.'

Clusters are geographically proximate groups of interconnected firms and institutions that share commonalities and complementarities (Porter, 1998). They include the following elements:

- Geographic Proximity: Firms within clusters are located near each other, enabling efficient logistics, collaboration, and knowledge sharing (Porter, 1998).
- Interconnectedness: Firms and institutions within clusters are linked through both vertical and horizontal relationships, enhancing cooperation and competition (Porter, 1990).
- Knowledge Spillovers: Clusters foster knowledge sharing among firms, facilitating innovation through informal networks and local interactions (Marshall, 1890; de Langen, 2002).
- Specialised Labour Market: Clusters often attract specialised labour, which is essential for industry-specific tasks and innovation (Marshall, 1890).
- External Economies: Firms benefit from shared infrastructure, reduced transaction costs, and collaborative innovation efforts within the cluster (Marshall, 1920).

3.4 Overview of Cluster Theories in Port Development

Maritime clusters are critical to both corporate operations and national economies. From a business standpoint, joining a maritime cluster allows enterprises to enhance competitiveness by accessing skilled labour, sharing information, and strengthening customer relationships (Li and Luo, 2021). These clusters provide an environment where maritime-related businesses and institutions thrive through mutual benefits. For example, in the Netherlands, significant suppliers are concentrated within maritime clusters, contributing to more than half of the enterprises' expenditures (de Langen, 2002; Li and Luo, 2021). Knowledge spillovers from players within these clusters further boost commercial benefits (de Langen, 2002).

Marine clusters have strategic importance for national economies. Many nations, including the UK, the Netherlands, and Japan, view their development as essential to regional and national growth. For instance, the UK marine industry generated £17 billion in Gross Value Added (GVA) and supported 220,100 jobs in 2017, showcasing its economic impact (Maritime UK, 2019). Similarly, Hong Kong's maritime sector, one of its pillar industries, contributed significantly to its GDP and employment (Li and Luo, 2021). Clusters not only foster regional and national economic development but also aid in the growth of upstream and downstream industries, such as manufacturing and export-oriented enterprises. The ripple effect of these clusters strengthens regional economies, employment, and innovation, particularly in coastal areas (de Langen, 2002).

Cluster theory provides a framework for understanding the dynamics of port development. According to Maskell and Kebir (2005), a comprehensive cluster theory must address three critical arguments:

Existence Argument: Why firms cluster and the benefits of proximity (e.g., knowledge spillovers, shared resources).

Extension Argument: The diseconomies that arise when clusters expand beyond certain geographical or sectoral limits, such as congestion and increased competition.

Exhaustion Argument: The potential decline of clusters as their competitive advantages diminish over time (Maskell & Kebir, 2005)

3.5 Port Regionalisation and Spatial Economic Planning

Port clusters not only support economic activities within the port but extend their influence through inland transport corridors and logistics hubs, as seen in the regionalisation of port logistics systems (Notteboom & Rodrigue, 2005). This expansion of port activities beyond traditional boundaries indicates the importance of integrated transport and logistics systems. The regionalisation of ports marks a new phase in port logistics, where port activities extend into inland transport systems, supporting the development of transport corridors and logistics hubs. This concept is critical for port cities like Rotterdam, Hamburg, and Le Havre, where ports are integrated into broader regional and

national economies (Merk & Hesse, 2012). For example, the Le Havre/Rouen port cluster contributes significantly to regional and national value-added activities, with substantial indirect effects on other economic sectors (Merk et al., 2011). However, the specialisation of these clusters has not favoured significant job creation, highlighting the challenges of balancing economic growth with employment opportunities.

3.6 Summary

This chapter has provided theoretical foundations essential for understanding the dynamics of maritime clusters and their pivotal roles in port development. By tracing the historical evolution of cluster theory, the chapter highlighted Alfred Marshall's contributions to the concept of geographic concentration and external economies, laying the groundwork for contemporary interpretations of cluster dynamics. The analysis of geographical clusters highlighted the competitive advantages that arise from proximity, collaboration, and knowledge sharing among firms, reinforcing the notion that clustering can drive performance improvements and innovation. Michael Porter's cluster theory was explored to demonstrate how local synergies among interconnected companies and institutions can generate significant economic benefits. The insights on maritime clusters revealed their strategic importance not only for individual businesses but also for national economies, showcasing their role in bolstering economic growth and regional competitiveness. The discussion on port regionalisation emphasised the necessity of integrated transport systems, illustrating how ports extend their influence beyond traditional boundaries to shape broader economic landscapes. The theoretical framework presented in this chapter provides a comprehensive understanding of the mechanisms through which maritime clusters operate and evolve. This foundational lens is guiding the research analysis. The following Chapter 4 covers the research methodology providing details for data collection and analysis.

Chapter 4: Research Methodology and Methods

The purpose of this chapter is to explain the methodology employed in this research. Firstly, this chapter begins by establishing the theoretical foundations of the case study approach, discussing their role in offering empirical insights into contemporary phenomena in real-life settings. It elaborates on the distinctive characteristics of case studies as highlighting elements such as the formulation of research questions, propositions, units of analysis, and logical connections that guide the interpretation of findings. Secondly, the chapter further emphasises the appropriateness of the case study approach for this research, particularly in terms of understanding the spatial distribution and regulatory influences on logistics firms in the vicinity of the Port of Cape Town. Thirdly, the chapter provides the rationale for the case study selection. Fourthly, the chapter details the quantitative and qualitative data collection and analysis methods utilised. Fifthly, the discussion on ethical considerations highlights the importance of maintaining integrity and ethical research practice throughout the research process. Lastly, the chapter concludes by summarising the insights gained from this approach, reinforcing its relevance for comprehending economic activities in Paarden Eiland.

4.1 Research Setting

The case study approach, on which this study is based, makes it easier to examine a phenomenon in its context by utilising a range of quantitative and qualitative data sources and analysis techniques (Baxter & Jack, 2008). Case studies facilitate empirical explorations of contemporary phenomena within their real-life contexts. The research questions, propositions (if applicable), units of analysis, logical connections between data and propositions, and criteria for interpreting the results are all components that make up a case study, as Yin (1994) emphasises. Case studies are not just variations of other research methodologies. Case studies were divided into three primary categories by Yin (1994): exploratory, explanatory, and descriptive. While explanatory case studies seek to identify causal correlations, exploratory case studies are usually the first steps towards more comprehensive research enquiries. Conversely, descriptive case studies concentrate on methodically describing occurrences. To improve comprehension of various methods within the case study framework, Stake (1995) further differentiated between intrinsic, instrumental, and collective case studies.

Empiricism is the foundation of this mixed-method research, which takes an unstructured, adaptable, and transparent approach to investigation, seeks to describe rather than measure, values in-depth knowledge and small samples, and investigates emotions and perceptions rather than numbers and facts. A descriptive study focuses mostly on description rather than analysing connections or correlations (Yin, 1994). A descriptive study offers information on, instance, the living conditions of a community or expresses attitudes towards an issue. It also aims to methodically describe a scenario, problem, occurrence, service, or program. Clarifying why and how two features of a situation or phenomena are related is the primary goal of an explanatory research.

The selected methodology for this research combines descriptive and explanatory approaches. Descriptive studies aim to portray a situation, problem, or phenomenon in detail, often providing information without focusing on causal links. Explanatory studies emphasise understanding how and why relationships exist between aspects of a phenomenon. This approach aligns with the broader objectives of qualitative research, which is rooted in empiricism, employs an unstructured and open-ended method of inquiry, and emphasises in-depth understanding and exploration of perceptions and feelings over measurable data.

Miles and Huberman (1994:25) describe the case as "a phenomenon of some sort occurring in a bounded context." "In effect, your unit of analysis" is the situation. Since the case study approach is predicated on the idea that the case under investigation is unusual among cases of a particular kind, a single example might provide light on the circumstances and occurrences that are common in the group from which the case was taken. It is a method where a specific case or a small number of carefully chosen cases are thoroughly examined. The idea of a case is not clearly defined and is still up for discussion. The entire research population must be treated as a single entity for the study to qualify as a case study. In qualitative research, it is among the most significant study designs. As Burns (1997: 364) states, 'to qualify as a case study, it must be a bounded system, an entity in itself. A case study should focus on a bounded subject/unit that is either very representative or extremely atypical.' A case study according to Grinnell (1981: 302), 'is characterised by a very flexible and open-ended technique of data collection and analysis'. "As a form of research, case study is defined by interest in individual cases, not by the methods of inquiry used" is how Stake (1998) states that the object of study is a case rather than the methods of investigation. "Case study is defined by interest in individual cases" (Johansson, 2007: 49) is Stake's broader definition. One of the main characteristics of case study methodology is the triangulation of methods, which involves mixing many approaches to illuminate a case from various perspectives. One type of triangulated research technique is a case study. Triangulation can take place with data, researchers, hypotheses, and even procedures, according to Feagin et al., (1991). Triangulation, according to Stake (1998), refers to the procedures employed to guarantee accuracy and alternate interpretations. The ethical requirement to verify the legitimacy of the procedures gives rise to the necessity of triangulation. This could be accomplished in case studies by utilising a variety of data sources (Yin, 1994). Establishing meaning beyond a specific location and circumstance is the primary challenge in case studies.

The primary critique of case study research is that its findings are not generally applicable to everyday situations. "In analytic generalisation, previously developed theory is used as a template against which to compare the empirical results of the case study" (Yin, 1994) is a well-written explanation of the distinction between analytic and statistical generalisation that Yin specifically provided to counter that criticism. Inappropriate generalisation makes the assumption that a sample of cases has been selected from a larger case universe. As a result, inaccurate terms like "small sample" are used, as if a single-case study represented a single respondent. A different strategy based on a more intuitive, empirically supported generalisation was advocated by Stake (1998). "Naturalistic" generalisation is what he called it. He made his case using the Criticisms of case studies as "unscientific" stem from their perceived lack of replicability and generalisability. However, scholars like Yin (1994) and Stake (1998), emphasising the distinction between analytic generalisation and statistical generalisation.

Analytic generalisation involves comparing empirical findings against theoretical frameworks, while statistical generalisation is not appropriate for case studies. Stake (1998) introduced the concept of naturalistic generalisation, suggesting that case study findings resonate with readers' experiences, fostering broader understanding. Triangulation is used in case studies to improve validity and reliability by utilising several data sources, researchers, theories, or procedures. Data source, investigator, theory, and methodological triangulation are the four categories of triangulation that Denzin (1984) distinguished. This triangulated approach ensures accuracy and reinforces the credibility of the research findings, making the case study methodology ideal for exploring the logistics dynamics in this study.

4.1.1 Appropriateness of the Case Study Approach

The case study approach is particularly relevant for this study due to its ability to provide an in-depth examination of the mix, spatial distribution, and regulatory influences on logistics firms in the vicinity of the Port of Cape Town. By focusing on a single case, this methodology allows the researcher to investigate the unique dynamics shaping the logistics sector in this specific urban context. The study's objectives; understanding the composition of logistics firms, their spatial distribution, and the role of land-use planning and regulation, require a detailed exploration that a case study approach is well-suited to deliver. The Port of Cape Town presents an atypical context, given its strategic importance, diverse logistics operations, and the influence of urban planning policies, making it an ideal subject for a single-case study.

One key advantage of the case study approach is its capacity to analyse phenomena that are not easily accessible or replicable in other contexts (Yin, 1994; Stake, 1995). The unique mix of logistics firms operating near the Port of Cape Town and the intricate interplay of market forces and regulatory frameworks represent a revelatory case. This methodology enables the researcher to delve into the specifics of how the mix of firms is shaped by factors such as market demand, land availability, and port-related operations. By examining these elements within the context of this single case, the study can uncover insights that contribute to broader theoretical understandings of urban logistics and spatial planning.

The spatial distribution of logistics firms around the port is another critical aspect of the study, and the case study approach provides the tools to explore this in detail. Using qualitative methods such as content analysis, the research can identify patterns in the placement of firms and how these relate to variables like land-use zoning, accessibility to transport networks, and proximity to the port itself. The case study methodology's flexibility also allows for an embedded design, where different units of analysis—such as specific clusters of firms—are examined within the larger case. This provides a comprehensive understanding of the spatial dynamics at play and the factors influencing these distributions.

The role of land-use planning and regulation in shaping the logistics landscape near the port justifies the need for a case study approach. Understanding how policies, zoning regulations, and development frameworks influence the placement and mix of logistics firms requires an in-depth,

context-specific analysis. The case study design enables the researcher to investigate the interactions between policy implementation and firm behaviour, drawing on multiple sources of evidence such as policy documents, interviews, and archival records. This triangulation enhances the validity of the findings and allows the study to offer insights into how regulatory frameworks can support or hinder efficient logistics operations in similar urban contexts.

The case study approach facilitates analytical findings, allowing the findings from this study to inform broader theoretical and practical considerations in urban logistics and spatial planning. While the focus remains on the Port of Cape Town, the insights derived from this context can be applied to other ports and urban areas with comparable characteristics. By employing deductive, inductive, and abductive reasoning, the study can contribute to theory building and testing, providing a deeper understanding of the relationships between logistics firms, spatial distribution, and regulatory frameworks. This combination of context-specific insights and broader applicability signifies the relevance and value of the case study methodology for this research.

Yin (2003) states that a case study design should be taken into consideration in the following situations: (a) the study's goal is to provide answers to the "how" and "why" questions; (b) you are unable to control the behaviour of study participants; (c) you wish to discuss contextual conditions because you think they are pertinent to the phenomenon being studied; or (d) it is difficult to distinguish between the phenomenon and context. Based on the research goals of gathering information on the kinds of activities and variables that influence logistics companies' site selections in Paarden Eiland, this study satisfies the case study requirements. It is a pertinent technique that takes into account the context that is suitable for answering the research questions.

The intricacy of a particular case can be captured by a researcher via a case study. Social science disciplines like sociology, psychology, anthropology, and economics can benefit from the use of case study technique (Johansson, 2007). Applied practice-oriented areas include business studies, planning, social work, architecture, education, and environmental studies (Johansson, 2007). However, Johansson (2007) contends that the case study is particularly significant in practice-oriented research domains like architecture and planning. Understanding a variety of instances is the foundation for acting in a professional manner. Either personal experience or published model cases within the profession serve as the basis for these examples. A professional repertoire can be developed through case studies. Other research techniques are combined in case studies. Triangulation offers an

One important component of the case study is the unit of analysis. Usually, it is a system of activity as opposed to a person or group of people. Case studies are often selective, concentrating on one or two key problems that are essential to comprehending the system under study. Multi-perspectival analyses are case studies. This indicates that the researcher takes into account not only the players' voices and points of view, but also the pertinent actor groups and their interactions. This particular feature stands out among the traits that case studies have (Feagin et al., 1991).

Case study research emphasises contextual analysis rather than sampling logic. It is not about sampling cases but selecting them to maximise what can be learned within the study's timeframe. Yin

(1994) emphasised the importance of protocols to enhance the reliability of case studies, especially in multiple-case applications. Protocols include sections such as project objectives, field procedures, study questions, and guidelines for reporting findings. While case studies are unique and do not follow fixed reporting formats, the discipline imposed by protocols is crucial for progress and reliability. Moreover, case studies adopt a multi-perspectival analysis, considering diverse data sources, which allows for a nuanced understanding of the studied phenomenon.

Three main categories of case studies were distinguished by Yin (1994): exploratory, explanatory, and descriptive. Because they aid in defining questions and hypotheses, exploratory case studies are sometimes regarded as a prelude to more extensive social research. In order to shed light on the fundamental connections between variables, explanatory case studies are used in causal investigations. In contrast, descriptive case studies need the formulation of a descriptive theory prior to the start of the study. Pyecha (1988) used this methodology in a research on special education that used a pattern-matching procedure. By adding three more categories of case studies, Stake (1995) broadened these divisions. When a researcher has a particular interest in a topic, they undertake intrinsic case studies. A single instance is used in instrumental case studies to provide a more thorough knowledge of

According to Yin (1994) the protocol for the study should include several essential sections to ensure clarity and coherence throughout the research process. First, an overview of the case study project will provide a detailed description of the project objectives, the specific issues being examined, and presentations related to the topic under investigation. This section will establish the context and scope of the study (Yin, 1994). Second, the protocol will outline field procedures, offering reminders about the steps to be followed during data collection, specifying the credentials required for accessing data sources, and detailing the locations of those sources to ensure smooth and efficient operations in the field (Yin, 1994). Additionally, the protocol will include case study questions, which will guide the investigator during data collection by highlighting the key inquiries that need to be addressed to meet the study objectives. Finally, the protocol will feature a guide for the case study report, providing an outline and format for presenting findings and conclusions. This structured approach ensures the study remains focused, systematic, and aligned with its objectives while facilitating the preparation of a comprehensive and well-organised final report (Yin, 1994). The general development and dependability of the study depend on the discipline the procedure places on the researcher. There is no commonly used format for reporting case studies. Since every case study is different, there is no set format for reporting. Unlike experimental research, the unit of analysis, research questions, and data collecting cannot be standardised. There may be single-case or multiple-case applications in each of the aforementioned case study kinds.

4.1.2 A Single-Case Study Approach

This study utilised a single-case study approach to investigate the cluster phenomenon under consideration in Paarden Eiland. Single-case studies are often used to confirm or challenge a theory or to analyse a unique, extreme, or revelatory case (Yin, 1994). They are particularly effective when the researcher gains access to a phenomenon that was previously inaccessible, offering valuable

insights. The decision to use a single-case approach in this study stems from the assumption that the selected case is atypical of its type and can therefore provide a deeper understanding of events and situations that are reflective of the broader group from which the case is drawn. As Burns (1997: 365) explains, the focus in a case study is on the case's idiosyncratic complexity rather than on generalising findings to an entire population. Case selection in single-case studies often relies on purposive, judgmental, or information-oriented sampling techniques. Similar to stratified sampling, clusters can be created based on shared traits or geographic proximity to the study's primary variable. Creating clusters can take place at single, double, or multiple stages, depending on the clustering level, guaranteeing a thorough analysis of the occurrence. Content analysis is often used to examine qualitative data, including documentation such regulations, guidelines, and interviews, in order to pinpoint important themes that show up in the information gathered. In keeping with the methodology's focus on qualitative investigation, this study employed content analysis to comprehend the positioning of logistics companies inside the study area.

Unlike multiple-case studies, which follow a replication logic, single-case studies emphasise analytical reasoning and focus on internal and construct validity. Theories are developed and tested within the single-case context, ensuring alignment between data collection and theoretical frameworks. While external validity is often cited as a limitation of single-case studies, Yin (1994) asserts that generalisation can be achieved through theoretical relationships rather than statistical sampling. Using a variety of evidence sources, including documentation, archival records, interviews, direct observation, participant observation, and physical artefacts, might improve construct validity (Yin, 1994). However, not every case study need every source.

The single-case approach also accommodates both intrinsic and instrumental interests. In an intrinsic case study, the focus is on understanding the unique aspects of the case without aiming to generalise findings. When the case is purposefully selected for its richness, criticality, or uniqueness, there is an interest in deriving broader insights from the findings. Generalisations in single-case studies are analytical rather than statistical, relying on reasoning principles such as deduction, induction, and abduction. Deductive reasoning involves testing hypotheses, while inductive reasoning generates theories from observed patterns. Abduction, as defined by Peirce (1992), deals with interpreting surprising facts by positing potential explanations, often blending elements of deduction and induction. Johansson (2007) notes that in practice, these reasoning modes are often combined, allowing researchers to test theories and generate new insights simultaneously.

The flexibility and depth of single-case studies allow for methodological triangulation, which combines various techniques, strategies, and theories to enhance validity. Triangulation enables researchers to analyse cases from multiple perspectives, ensuring the reliability of findings and fostering analytical generalisations that resonate with broader theoretical frameworks. As Layder (1998) suggests, the integration of theory testing and generation, known as the "adaptive theory approach," exemplifies the potential of single-case studies to contribute both to understanding specific phenomena and to advancing theoretical knowledge.

Case-based generalisations are analytical rather than statistical. They are grounded on logic. Deductive, inductive, and abductive reasoning are the three pillars of reasoning. One or a mixture of these concepts can be used to draw generalisations from an instance. The process is comparable to an experiment when a generalisation is founded on the deductive principle: a hypothesis is developed, and testable conclusions are drawn through deduction (Johansson, 2007). The theory can be confirmed or refuted by contrasting the actual results with the expected findings, which are inferred from a theory and a case. Consequently, the domain in which the theory is applicable can be more precisely defined (Johansson, 2007). Important cases for the theory are chosen. The

The process of testing hypotheses is employed when a generalisation is founded on the deductive principle. Inductive theory-generation, also known as conceptualisation, is a second way to generalise (Johansson, 2007). The abduction principle underpins the third mode (Johansson, 2007). According to Johansson (2007), abduction is the process of confronting an unexpected reality, applying a rule, and then putting up a possible argument. However, there are two types of kidnapping: The first is when a case is built around a few facts, such as historical information or hints (Johansson, 2007). The other works when generalisations are drawn from well-known situations and then applied to a real-world problem scenario through the use of pertinent analogies (Johansson, 2007). Another name for this is naturalistic generalisation. Within a case study, the various This is how generalisations are made, according to grounded theory (Glaser and Strauss, 1967). The principle of deduction states that a conclusion drawn from a case or rule is always true. The conclusion is true if the premises are true. Something must be true, as demonstrated by deduction. Using induction, we can draw a rule from the facts of a case that is likely to apply in comparable situations. The process of confronting an unexpected truth, applying a rule (existing or developed specifically for the situation), and then putting up a possible argument is known as abduction. (Peirce, 1992)

4.1.3 Delimitation of the Study

This study focuses on the case study of Paarden Eiland, a key industrial and logistics hub located within the City of Cape Town Metropolitan Municipality, South Africa. It is strategically positioned adjacent to the Port of Cape Town, one of the busiest ports in the country, providing critical infrastructure for international trade and local economic activity. The study area includes the Table Bay District, where Paarden Eiland is situated, and extends into neighbouring districts like the Blaauwberg District. It is bounded by major transportation corridors, including National Roads (N1 and N2), arterial routes, and railway lines that connect the port to inland regions. This connectivity reinforces Paarden Eiland's role as a center for logistics activities such as warehousing, freight services, and distribution.

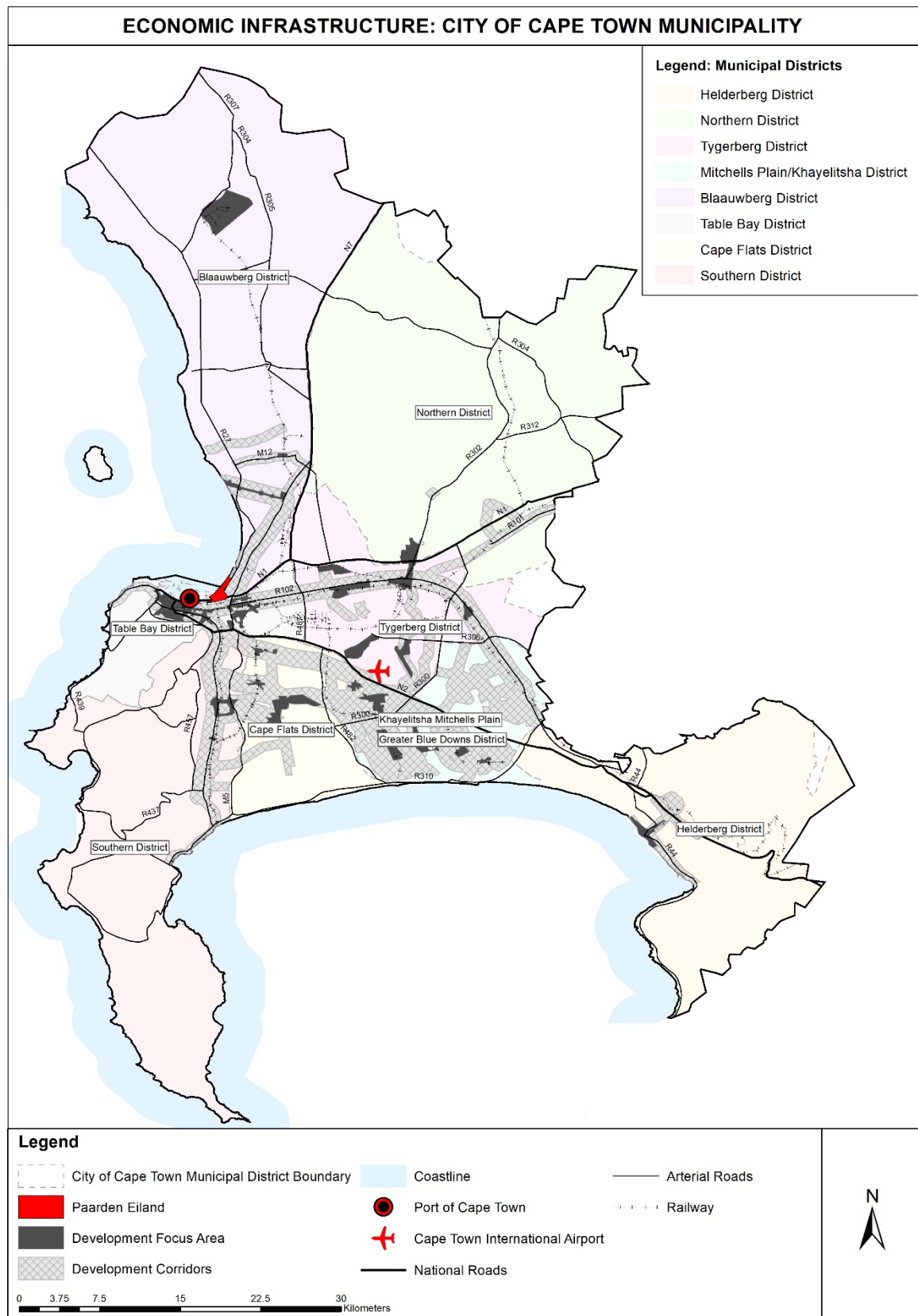


Figure 4.1: Locality of Paarden Eiland in the context of economic infrastructure and key economic zones in the City of Cape Town Municipality

Figure 4.1 illustrates the study area within the broader municipal boundaries of the City of Cape Town. Key spatial features highlighted include proximity and transport infrastructure. Proximity to the Port of Cape Town, is shown as a critical node for maritime trade. Transport infrastructure includes arterial and national roads like the N1 and N2, which facilitate access to inland markets. Paarden Eiland's location, marked in red, emphasises its spatial relationship to both the port and major urban centers.

The delimitation focuses on the spatial distribution and locational dynamics of logistics firms in this area, emphasising their agglomeration patterns and interaction with the transport and port infrastructure. By narrowing the study to Paarden Eiland, it becomes possible to analyse the micro-scale factors contributing to its prominence as a logistics hub within the regional economy.

A visual aid for comprehending the administrative and physical environment of the research region is the locality map. Logistics companies usually locate in industrial regions because to the substantial land and/or building requirements compared to the cheaper land cost; therefore, it was decided to restrict the research to these areas. The literature has demonstrated links between the location of logistics facilities and industrial districts; some researchers even contend that the logistics space is an industrial space (Janic, 2003; McKinnon, 2018; Rodrigue, 2020). Delineating the study area according to the relationship between the location of industrial zones and logistics facilities was the main goal of the first preliminary step. In order to determine the location and size of industrial zones around the city, information in

The land-use categories "industrial" and "commercial_industrial" were taken from the shapefile in order to define industrial areas. The breadth of industrial zones was mapped using these categories as the foundation. The isolated industrial areas shapefile was overlay with a non-residential land-use geodatabase to ensure correctness. This cross-referencing showed a high degree of overlap between the two datasets, confirming their accuracy. However, discrepancies arose due to changes in planning boundaries across different years and urban development that occurred after the initial data compilation. Aerial imagery from Google Maps was used to validate areas where the non-residential data suggested significant development but were not identified in earlier industrial land-use data. It is important to note that the non-residential geodatabase provided only a broad categorisation of land uses and did not detail the specific components. While useful, this dataset alone was insufficient to define the full extent of industrial areas.

Making a list of logistics companies based in the designated industrial and economic hubs was the second preliminary activity. AfriGIS provided the logistics company data. The shapefile of industrial and economic nodes found during the previous preliminary phase using municipal land-use datasets was supplied to AfriGIS to direct the data extraction procedure. This ensured alignment between logistics firm data and the delineated industrial areas.

4.2 Case Study: Paarden Eiland

4.2.1 Strategic Importance of Paarden Eiland

Paarden Eiland, located adjacent to the Port of Cape Town, is a critical hub for logistics activities and industrial development in the Cape Town metropolitan area. Its proximity to the port makes it a natural site for logistics firms seeking to leverage the efficiencies of maritime transport and associated supply chain networks. The area has long been recognised for its concentration of transport and warehousing facilities, benefiting from excellent access to road infrastructure and connectivity to broader industrial zones (Mokhele and Fisher-Holloway, 2024). Paarden Eiland is one of many industrial areas within the City of Cape Town, strategically located near the Port of Cape Town (City of Cape Town, 2016; Mokhele and Fisher-Holloway, 2024). It hosts 639 businesses across 471 LIS keys, with dominant economic activities including wholesale and retail trade (45%) and manufacturing (29%) (City of Cape Town, 2016). The area is well-connected with major roads and highways, enhancing the efficiency of land transport for goods. The presence of diverse businesses creates a supportive ecosystem for logistics operations. Paarden Eiland's strategic location near the port facilitates easy access to shipping and receiving goods, reducing transportation costs and time, making it an ideal hub for logistics firms. As a key industrial node, Paarden Eiland exemplifies the dynamics of logistics clustering, where spatial proximity enables operational efficiencies, cost savings, and economic growth. The choice of Paarden Eiland as the main site for this study reflects its prominence in the regional logistics landscape and its potential to illustrate the spatial patterns and regulatory influences on logistics firms near ports (Hylton & Ross, 2018; Rivera et al., 2014).

4.2.2 Contextual Role of the Port of Cape Town

The Port of Cape Town provides the essential infrastructure and economic foundation for logistics activities in Paarden Eiland. The port is one of South Africa's eight commercial ports, handling a variety of cargo, including containers, break-bulk, and liquid bulk goods. Its strategic location at the southern tip of Africa facilitates maritime trade routes between Europe, the Americas, the Middle East, and Australia. The port's operations directly influence the functioning of nearby industrial zones, such as Paarden Eiland, by enabling import-export activities and serving as a critical node in national and regional supply chains. This interconnectedness highlights the importance of examining the spatial and functional relationship between the port and Paarden Eiland (Havenga et al., 2017).

4.2.3 Transport Infrastructure and Connectivity

Paarden Eiland benefits from a robust transport network that links it to the port and other key economic areas. The availability of well-developed road infrastructure allows seamless movement of goods between the port and inland markets, supporting the clustering of logistics firms in the area. The role of transport infrastructure is particularly significant in logistics clusters, where proximity to major nodes such as ports can reduce costs, improve delivery times, and enhance competitiveness. The

area's reliance on the port's connectivity highlights the importance of examining Paarden Eiland's locational advantages within the broader logistics framework (Richer, 2010).

4.2.4 Agglomeration and Logistics Cluster Dynamics

The concentration of logistics firms in Paarden Eiland aligns with theories of agglomeration economies, where the spatial clustering of related businesses generates shared benefits such as reduced transport costs, access to skilled labour, and knowledge spillovers. Paarden Eiland exemplifies a logistics cluster where firms co-locate to capitalise on proximity to the port and access to complementary services, such as customs, warehousing, and distribution. This clustering effect not only enhances operational efficiencies for individual firms but also contributes to the economic vitality of the Cape Town metropolitan area (Hylton & Ross, 2018; Rivera et al., 2014).

4.2.5 Supporting Functions and Value-Added Services

Paarden Eiland is also home to value-added services that enhance its appeal as a logistics hub. These services include customs clearance, container storage, and freight forwarding, which are critical for facilitating international trade through the Port of Cape Town. The availability of such services within close proximity to both the port and logistics firms in Paarden Eiland strengthens its role as a strategic location for logistics activities. By focusing on Paarden Eiland, this study provides insights into the interplay of transport infrastructure, land-use planning, and economic clustering in fostering a thriving logistics sector (Havenga et al., 2017).

In conclusion, the selection of Paarden Eiland as the primary case study site, with the Port of Cape Town as a contextual reference, is highly relevant for addressing the research problem. The area's strategic location, robust infrastructure, and clustering dynamics offer a rich context for exploring the spatial distribution, firm mix, and regulatory influences on logistics clusters in South Africa.

4.3 Research Methods

4.3.1 Data Types and Sources

Table 4.1: Summary of data sources and analysis methods per research question

Research Question	Data	Data Source	Data Analysis Methods
1. What is the mix of the logistics firms located in Paarden Eiland, in the vicinity of the Port of Cape Town?	Georeferenced data of logistics-related firms located in Paarden Eiland.	Georeferenced data from AfriGIS. GIS Shapefiles from City of Cape Town Open Data Portal (Land	Frequency analysis. Classification of Economic Activity.

		Administration Data)	
2. How are the logistics firms spatially distributed in Paarden Eiland?	Georeferenced data of logistics-related firms located in Paarden Eiland .	Georeferenced data from AfriGIS. GIS Shapefiles from City of Cape Town Open Data Portal (Economic Development Areas and Corridors)	Spatial analysis in GIS software.
3. What is the role of land-use planning and regulation in influencing the mix and placement of logistics firms in Paarden Eiland?	Zoning information Applicable spatial plans	GIS Shapefiles from City of Cape Town City Map Viewer and Open Data Portal City of Cape Town district plans (Table Bay District and Blaauwberg District Plans) Paarden Eiland CID Business Plans	Spatial analysis in GIS software Content analysis of plans

The following subsections provide details to the Table 4.1 summary of data sources and analysis methods.

4.3.1.1 The mix of logistics firms in the vicinity of the Port of Cape Town

To address the first research objective, data on the mix of logistics firms were obtained from AfriGIS, a comprehensive geographic data provider. AfriGIS supplied a detailed list of logistics firms operating within the vicinity of the Port of Cape Town. The study population includes all the logistics firms in Paarden Eiland as per the AfriGIS data. This dataset provided essential insights into the types of logistics firms in the area, their operational characteristics, and their contribution to the overall logistics landscape near the port.

4.3.1.2 The spatial distribution of logistics firms around the Port of Cape Town

The second goal was addressed using Geographic Information System (GIS) data, which was likewise obtained via AfriGIS. The literature has extensively shown the tendency of logistics facilities to cluster in industrial locations, making a knowledge of their spatial distribution necessary. The City of Cape Town Municipality provided additional information on the primary economic and industrial hubs in the City of Cape Town metropolitan area. These data served as the foundation for the study and were used to map the size of the city's industrial districts.

4.3.1.3 The role of land-use planning and regulation in influencing the mix and placement of logistics firms near the Port of Cape Town

To examine how land-use planning and regulation affect the mix and placement of logistics firms, zoning data were obtained from the City of Cape Town Open Data Portal. These zoning datasets were analysed in ArcGIS to explore zoning patterns and identify how different categories of logistics firms align with land-use regulations in the study area.

Additionally, the City of Cape Town's Spatial Development Framework (SDF) was obtained from the municipality's official website. Content analysis was conducted on the SDF to extract key visions, policies, and guidelines regarding the placement and development of logistics firms in the region. This analysis provided insights into how regulatory frameworks and planning policies shape the spatial distribution and composition of logistics operations around the Port of Cape Town.

4.3.2 Data Analysis

To fulfil the study's research objectives, data analysis entails methodically reviewing, classifying, and recombining evidence (Yin, 1994). Since this is one of the less defined aspects of case study methodology, researchers must properly analyse data by drawing on both their own experience and the body of existing literature. Miles and Huberman (1994) assert that methods like array construction, event frequency tabulation, and display construction can be used to evaluate data in order to methodically present and interpret evidence. These techniques seek to reduce bias and guarantee the validity of the results. The necessity of a general analytical strategy to direct data analysis choices is emphasised by Yin (1994). Among the strategies he outlines, pattern-matching and explanation-building are widely used. Pattern-matching involves comparing observed patterns to predicted ones, enhancing the internal reliability of the study (Trochim, 1989). Explanation-building is an iterative approach in which a theoretical statement is refined and revised through multiple cycles of analysis. Both techniques are integral to analysing case studies and are used to ensure the alignment of findings with theoretical propositions. Content analysis is another essential method, particularly for qualitative data. This approach identifies recurring themes within the data by systematically analysing documents, policies, and guidelines. In this study, content analysis complements spatial analysis by providing qualitative insights into the regulatory and planning frameworks that influence logistics operations.

4.3.3 Data Analysis by Research Objective

4.3.3.1 The mix of logistics firms in the vicinity of the Port of Cape Town

Frequency analysis was applied to categorise the logistics firms identified in the study area. This method quantified the presence of different types of logistics firms, highlighting their relative significance within the vicinity of the Port of Cape Town and provided basic statistical analysis of types of economic activities based on the mix of logistics firms. Explanation-building, an iterative process, was used to develop theoretical insights into the factors influencing the mix of logistics firms. The

analysis discussion draws from the theoretical framework (Chapter 3) and literature review (Chapter 2).

4.3.3.2 The spatial distribution of logistics firms around the Port of Cape Town

Using ArcGIS software, a spatial analysis was performed to look at how logistics companies were distributed and clustered throughout the research area. The spatial patterns of logistics business locations were investigated using analytical techniques such as network analysis, cluster pattern identification, and buffer analysis. These techniques provided insights into the spatial logic of logistics operations by assisting in determining how close logistics companies were to important nodes, like the Port of Cape Town, industrial districts, and transportation networks.

4.3.3.3 The role of land-use planning and regulation in influencing the mix and placement of logistics firms near the Port of Cape Town

Zoning data from the City of Cape Town Open Data Portal were analysed using ArcGIS to assess the alignment of logistics firms with zoning regulations. Additionally, content analysis was conducted on the City of Cape Town's Spatial Development Framework (SDF) and District Plans to extract guidelines and visions relevant to logistics operations. This approach enabled the identification of themes and policy directives shaping the spatial distribution and functional mix of logistics firms. The content analysis of municipal documents revealed how zoning classifications, such as industrial and mixed-use zones, influenced the establishment of logistics firms. The analysis methods applied provide a comprehensive understanding of the regulatory frameworks governing logistics activities in the study area.

4.3.4 Ethical Considerations

The research adhered strictly to ethical guidelines as outlined by the Cape Peninsula University of Technology's ethics committee. Ethics clearance was obtained prior to the commencement of the study (Annexure A). Ethical considerations are paramount in socio-economic research. The following ethical principles and considerations were applied throughout the research process; respect for participants and stakeholders, confidentiality and data protection, informed consent, integrity and honesty in research. Direct interaction with individuals was not a primary component of this research thus the informed consent was not applicable to the study. In terms of respect for participants and stakeholders, the study primarily utilises secondary georeferenced data and publicly available zoning information, every effort was made to consider the interests and perspectives of local stakeholders, including logistics firms and regulatory authorities.

The confidentiality and data protection principle was applied while analysing data to ensure that any firm-specific data, where applicable, did not compromise the confidentiality of any individual, firm or organisation. Data were anonymised as necessary and only referred to in terms of geographic location

and firm typology to protect sensitive information, ensuring compliance with ethical norms regarding privacy. The research was conducted with a commitment to integrity and honesty. All data sources, methodologies, and analyses were reported transparently to avoid any misrepresentation of findings. Acknowledging the limitations and potential biases within the data analysis ensures the credibility of the research outcomes. The implications of the research findings on the local communities and economies were considered throughout the study. By analysing logistics firms' spatial distribution and the influence of land-use planning, the research aims to contribute positively to urban development discourse, thereby benefiting local stakeholders. By adhering to ethical research principles, the research ensured reliable outcomes that contributed to the understanding of logistics operations and their socio-economic implications in the vicinity of the Port of Cape Town. These considerations are integral to fostering trust and enhancing the discourse surrounding urban planning and logistics management in socio-economic studies.

4.3.5 Summary

Chapter 4 outlined the methodology underpinning the research, emphasising the case study approach employed to explore the economic activities of logistics firms present in Paarden Eiland. By integrating various data sources and employing a mix of qualitative and quantitative analytical techniques, the study has established a comprehensive understanding of the spatial distribution, firm typologies, and regulatory influences in the vicinity of the Port of Cape Town. The ethical considerations integral to this research further enhance the credibility and reliability of the findings. Chapter 5 presents the findings and analysis derived from this methodology provided in this chapter, highlighting key insights and interpretations that emerge from the data collected.

Chapter 5: Findings

This chapter presents the findings of the logistics cluster in Paarden Eiland, focusing on the mix and spatial distribution of logistics firms in the area, as well as the influence of land-use planning and regulation on their organisation. The chapter highlights the dynamics of Paarden Eiland as a logistics hub adjacent to the Port of Cape Town. The analysis addresses the research objectives (1) the mix of logistics firms, (2) the spatial distribution of logistics firms, and (3) the role of land-use planning and regulation influencing the mix and placement of logistics firms within the study area. To achieve the research objectives, data analysis and spatial analysis was used to map the geographic distribution of logistics firms, highlighting logistics firms in Paarden Eiland and proximities to key transport infrastructure such as the Port of Cape Town and arterial roads. Frequency analysis was conducted to quantify and analyse the prevalence of different logistics firm typologies within Paarden Eiland. Content analysis was used to interpret spatial development frameworks and district plans and policies, zoning regulations, and planning documents to understand their influence on the spatial and functional characteristics of the logistics cluster. The analysis provides a multi-dimensional perspective on the logistics cluster in Paarden Eiland, allowing for a comprehensive explanation of its dynamics and their alignment with the City of Cape Town's urban and economic development goals.

5.1 Description of the Mix of Logistics Firms

This section discusses the mix of logistics activities, spatial planning, and in the vicinity of the Port emphasising Paarden Eiland's role as a strategic logistics hub within the City of Cape Town municipality. The findings of logistics firms in Paarden Eiland reveals a diversified mix of categories, including warehousing, freight, distribution, couriers, and other related activities. This classification was derived from AfriGIS data and verified through spatial mapping, which shows a concentration of these firms near the Port of Cape Town, a strategic node for logistics and transport activities. Logistics firms in Paarden Eiland were grouped into distinct typologies, each serving a specialised function within the supply chain. Table 5.1 presents the firm typologies based on the AfriGIS data.

Table 5.1: Firm typologies based on the AfriGIS data.

Typology	Definition
1. Warehousing	Firms with facilities dedicated to the storage of goods until they are needed for distribution.
2. Freight	Firms that specialise in the transportation of goods in bulk, typically involving trucks, ships, or trains.

3. Distributors	Firms focused on supplying products and large-scale distribution.
4. Couriers	Firms involved in Fast delivery services for small parcels and documents based on end-user demand.
5. Movers	Companies that specialise in relocating household goods or office contents.
6. Packaging	Firms that specialise in the process of preparing goods for transport, storage, and sales, ensuring safety and presentation.
7. Logistics	Firms involved in the planning and management of the flow of goods, services, and information throughout the supply chain.
8. Suppliers	Firms that provide raw materials or products to manufacturers or other businesses.

According to the data presented in Table 5.2 and figure 5.1, the largest typology in Paarden Eiland is distributors, making up 36% of the total indicating a strong focus on distribution in the area. Suppliers also represent a significant portion at 31%. Couriers account for the smallest percentage at 2%. Distributors and suppliers play crucial roles in the logistics ecosystem, indicating a focus on the supply and distribution side. An examination of the frequency of firms within each typology highlights a significant presence of distributors and freight firms in Paarden Eiland. Couriers, while fewer in number, illustrate the growing importance of last-mile delivery, particularly with the rise of e-commerce. Packaging and movers, though minor contributors, enhance the cluster's overall service diversity. Logistics firms also play a significant role with 8 firms actively involved in managing supply chains.

Table 5.2: Mix of logistics firms in Paarden Eiland.

Typology	Number of Firms per Typology	Percentage
Warehousing	2	3%

Freight	3	5%
Distributors	21	36%
Couriers	1	2%
Movers	3	5%
Packaging	2	3%
Logistics	8	15%
Suppliers	18	31%
Total Data Points	58	100%

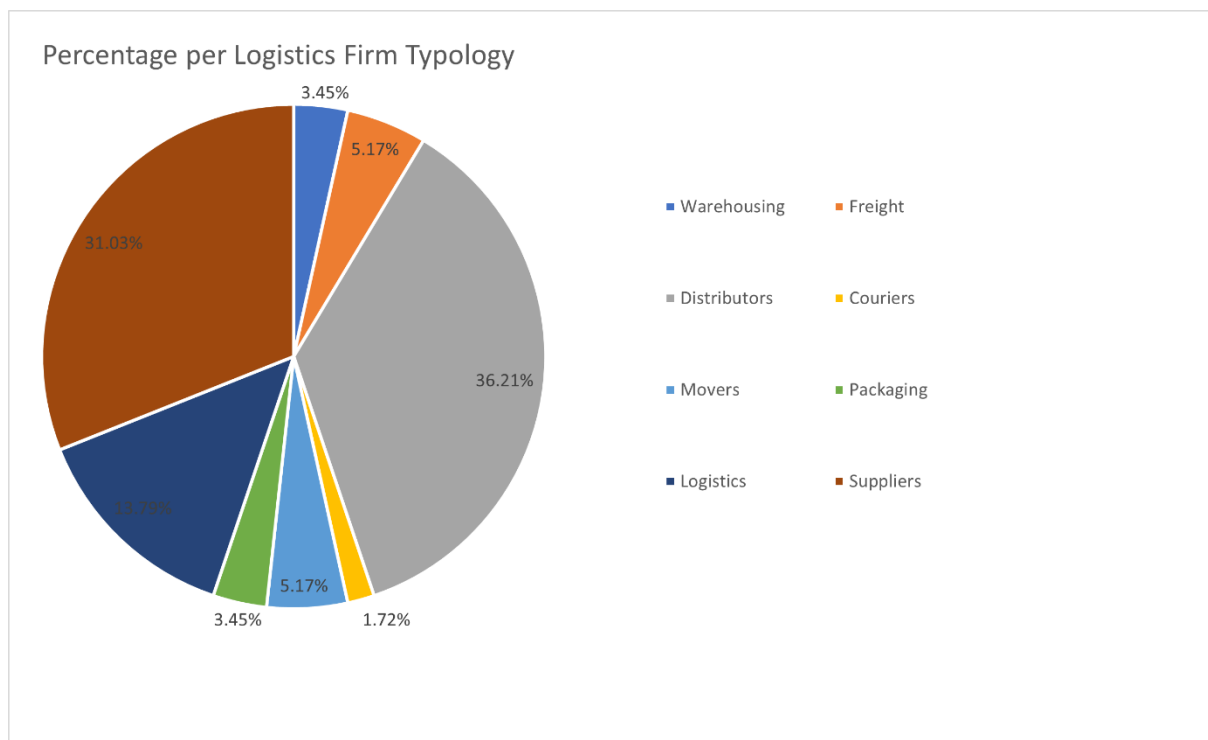


Figure 5.1: Percentage mix of logistics firms in Paarden Eiland.

Figure 5.2 below shows the port typology for Paarden Eiland in the City of Cape Town Municipality. It categorises different businesses within the area using a typology legend, with colour-coded symbols

representing various industries such as logistics, freight, distributors, packaging, warehousing, suppliers, movers, and couriers. The maps also illustrate the boundaries of Paarden Eiland site based on the City of Cape Town's land administration suburb boundaries. The Paarden Eiland site spans two planning districts, namely, Table Bay District and Blaauwberg District. The site is accessible through the N1 National Road and arterial roads providing transport links.

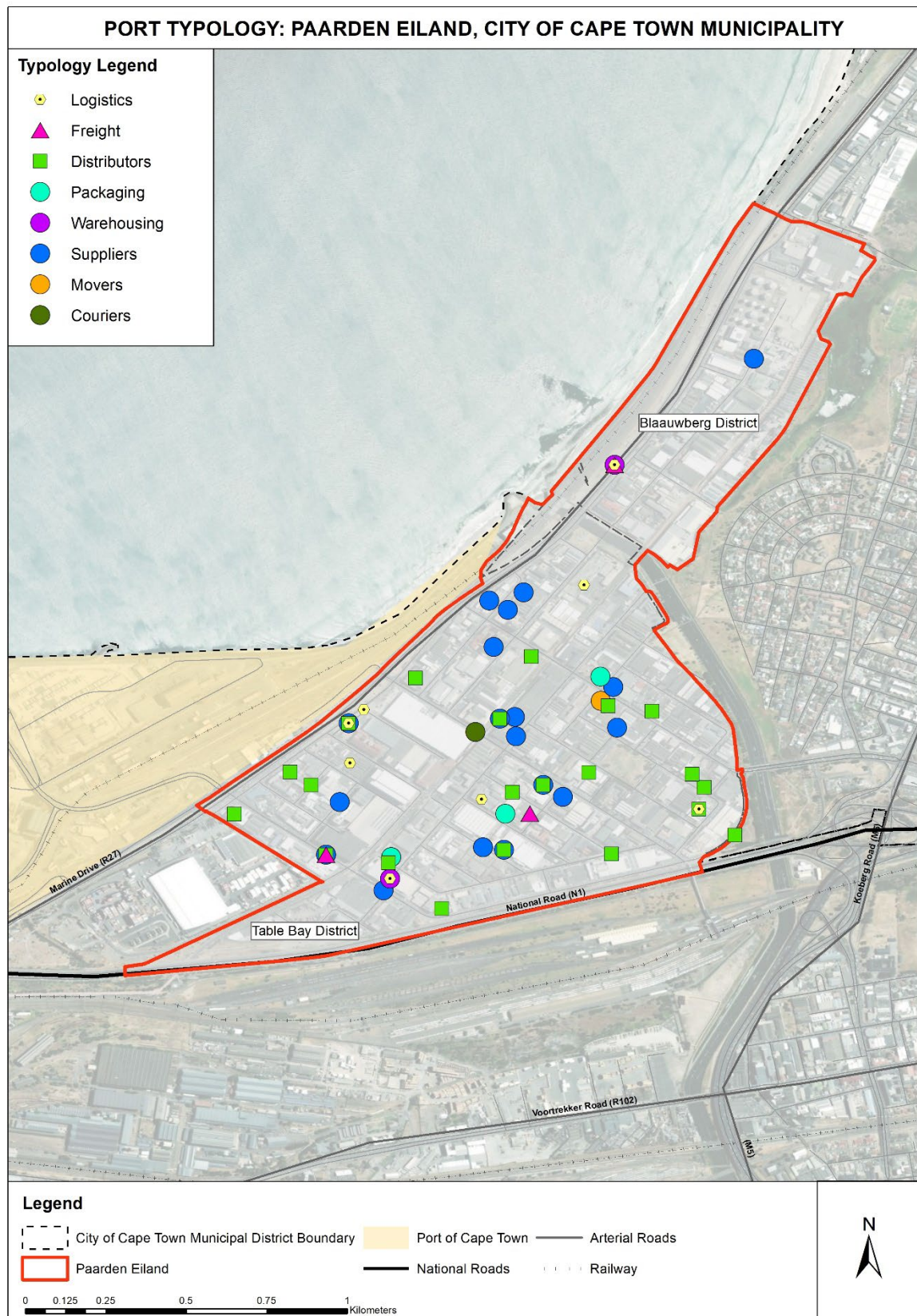


Figure 5.2: Spatial representation of the mix of logistics firms in Paarden Eiland

The findings illustrated on the map also show several firms in Paarden Eiland that are classified under multiple typologies, indicated by clusters of different coloured symbols at one location. This suggests a diverse range of services provided by these firms. For instance, some locations combine logistics and warehousing capabilities, allowing them to manage both storage and transportation efficiently. Other businesses act as both distributors and suppliers, handling the flow of goods to various markets. Additionally, some entities manage freight operations while also providing courier services, thus accommodating both large-scale shipments and local deliveries. Having multiple typologies can reflect a flexible business model, allowing these companies to meet various customer needs, optimise operations, and adapt to market demands. It may also indicate a strategic advantage in Paarden Eiland, facilitating comprehensive service offerings in proximity to key transport infrastructure. Table 5.3 summarises the various typology combinations along with the number of firms based on the data.

Table 5.3: Categories of typology combinations.

Typology Combination	Number of Firms	Description
1. Logistics, Freight and Warehousing	1	Firms that manage both the storage and transportation of goods, providing an integrated service for efficient supply chain management.
2. Logistics, Distributors and Suppliers	1	Firms supply products and oversee distribution networks, ensuring products reach various markets effectively.
3. Distributors and Suppliers	3	Firms that focus on handling larger shipments while also managing more localised delivery services to meet diverse customer needs.
4. Logistics, Freight, Suppliers	1	Firms combining elements of logistics and freight services with a focus on supplying products, facilitating both storage and transportation
5. Logistics and Warehousing	1	Firms that integrate logistics operations with warehousing,

		providing comprehensive storage and management of goods.
6. Logistics and Distributors	1	Firms that combine logistics functions with distribution services to ensure effective delivery and supply chain efficiency.
Total	8	

Based on the spatial representation of the mix of logistics firms in Paarden Eiland the data points located on one address were grouped as one firm consisting of typology combinations. The combinations were identified, categorised and counted as shown in Table 5.3. This ensured that there was no overlap in the counts. Table 5.4 summarises the consolidation of combination and singular typologies indicating a total unique firm count of 48 when avoiding doubling counting in combination firms. Distributors are still the largest typology in the table, emphasising their significance in the supply chain of firms located in Paarden Eiland in proximity to the Port of Cape Town.

Table 5.4: Summary of logistics firms in Paarden Eiland

Consolidated Typologies	Number of Firms	Description
1. Logistics, Distributors and Suppliers	1	Firms that supply products and oversee distribution networks, ensuring products reach various markets effectively.
2. Logistics, Freight and Warehousing	1	Firms that manage both the storage and transportation of goods, providing an integrated service for efficient supply chain management.
3. Logistics and Warehousing	1	Firms that integrate logistics operations with warehousing, providing comprehensive storage and management of goods

4. Logistics and Distributors	1	Firms that combine logistics functions with distribution services to ensure effective delivery and supply chain efficiency.
5. Logistics, Freight, Suppliers	1	Firms combining elements of logistics and freight services with a focus on supplying products, facilitating both storage and transportation
6. Distributors and Suppliers	3	Firms that focus on handling larger shipments while also managing more localised delivery services to meet diverse customer needs.
7. Logistics	4	Firms involved the planning and management of the flow of goods, services, and information throughout the supply chain.
8. Distributors	16	Firms focused on supplying products and large-scale distribution.
9. Freight	1	Firms that specialise in the transportation of goods in bulk, typically involving trucks, ships, or trains.
10. Couriers	1	Firms involved in fast delivery services for small parcels and documents based on end-user demand.
11. Movers	3	Companies that specialise in relocating household goods or office contents.
12. Packaging	2	Firms that specialise in the process of preparing goods for transport, storage, and sales, ensuring safety and presentation.

13. Suppliers	13	Firms that provide raw materials or products to manufacturers or other businesses.
Total unique firm count	48	

Photographs



Figure 5.3: Street view of large warehouses (Letsoalo, 2025).

Figure 5.3 depicts large warehouse-style buildings of logistics firms on both side of the road in Paarden Eiland. There is a pedestrian crossing and traffic lights that accommodates both vehicular and pedestrian traffic. The facilities indicate economic activities related to storage, distribution, and transportation.



Figure 5.4: Large logistics firm building and trucks (Letsoalo, 2025).

Figure 5.4 shows a large industrial building with trucks parked alongside it, suggesting activities related to logistics or warehousing. The trucks imply that this area is involved in the transportation or distribution of goods. The building's size and the presence of trucks indicate a focus on freight handling and logistics operations in Paarden Eiland.

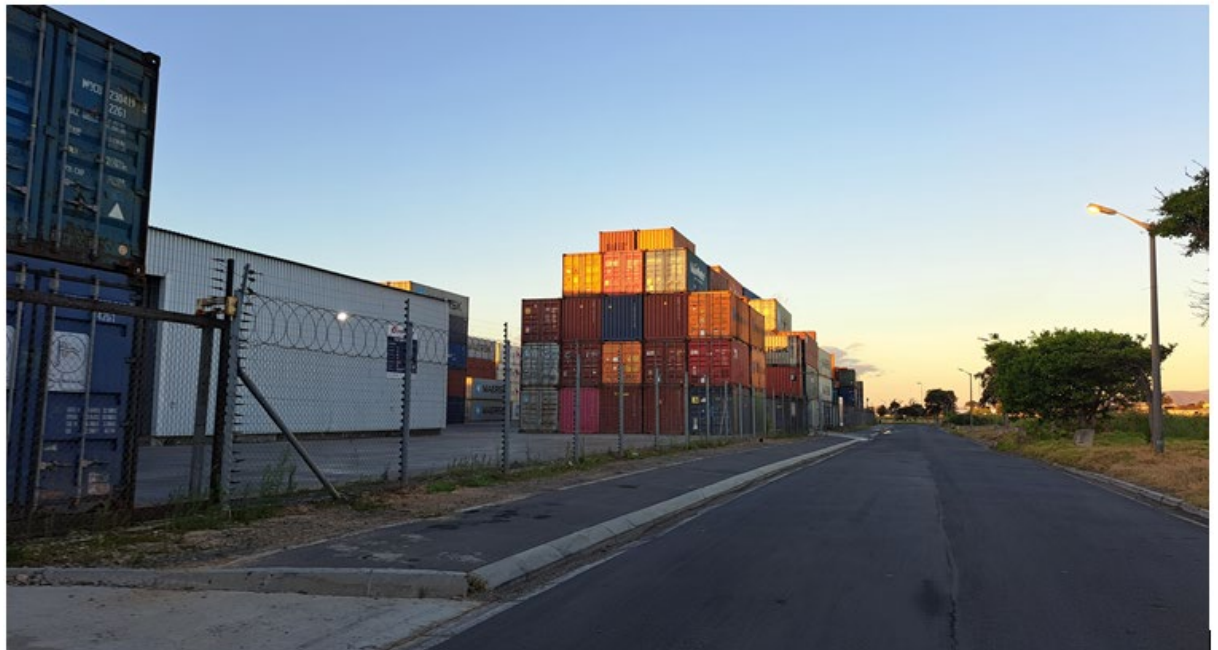


Figure 5.5: Shipping containers on fenced premises of logistics firm (Letsoalo, 2025).

Figure 5.5 shows a stack of shipping containers, commonly associated with logistics and freight activities in the vicinity of the Port of Cape Town. These containers are usually found in areas close to ports or transportation hubs, facilitating the import and export of goods. The surrounding infrastructure, including the road and fencing, suggests secure storage and transport facilities. This setting indicates active economic activity related to shipping logistics, and supply chain management in Paarden Eiland.



Figure 5.6: Cold storage facility (Letsoalo, 2025).

Figure 5.6 displays a facility for refrigerated storage. The name of the firm is covered to maintain anonymity. Cold storage facilities are essential in the logistics chain, particularly for perishable goods such as food and pharmaceuticals. The presence of such a facility highlights the importance of temperature-controlled logistics in the region. This building's strategic location near the Port of Cape Town signifies its importance in the supply chain, facilitating the storage and distribution of temperature-sensitive agricultural produce exported from South Africa.



Figure 5.7: Stacks of material and products outside warehouse building (Letsoalo, 2025).

Figure 5.7 depicts an industrial area with several warehouse-style buildings and stacks of materials, possibly packaging or products ready for distribution. The presence of these materials suggests activities related to warehousing and logistics, indicating that this location supports the storage and movement of goods. The layout, with wide streets and access points, is conducive to freight operations, which are essential for efficient supply chain management. This setting reflects the economic activity typical of logistics networks that often surround ports or major transport hubs.



Figure 5.8: Logistics firm with multiple loading and parking bays (Letsoalo, 2025)

Figure.5.8 shows structures of logistics firm that carries out economic activities related to storage and distribution. The presence of multiple loading bays suggests that these facilities are designed for efficient handling of goods, allowing for easy loading and unloading operations. This type of setup is typical in Paarden Eiland, facilitating the movement of products and contributing to the overall efficiency of the supply chain in the vicinity of the Port of Cape Town.

5.2 Spatial Distribution of Logistics Firms

5.1.1 Spatial Distribution of Logistics Firms Geographic Concentration and Patterns

The data findings further reveals that the majority of logistics firms are situated on the southern area of the site closest to the Port of Cape Town, highlighting the critical role of geographic proximity in influencing locational choices. This proximity reduces transit times for goods entering and leaving the port, making Paarden Eiland a competitive location for logistics operations. Beyond this core area, the density of firms decreases, indicating a sharp spatial concentration within the immediate vicinity of transport nodes.

Most firms are located within close proximity of the port or key arterial roads. This close spatial relationship shows the reliance of logistics operations on efficient physical connectivity, which is vital for maintaining competitive supply chain networks. Furthermore, clustering patterns demonstrate how firms co-locate to benefit from shared infrastructure and agglomeration economies, which include access to a skilled workforce and logistical synergies.

The spatial distribution of logistics firms in Paarden Eiland reflects a highly concentrated pattern closely tied to the area's strategic proximity to the Port of Cape Town and major transport infrastructure. Mapping the distribution of logistics firms across Paarden Eiland demonstrates a dense clustering along key arterial roads and within close proximity to the port facilities. The findings indicate a core zone of logistics activity centred around the southern part of Paarden Eiland, where warehousing, freight, and courier firms dominate. This clustering suggests that firms are leveraging proximity to the port for efficient supply chain operations, particularly for activities requiring quick turnaround times, such as freight handling and distribution.



Figure 5.9: Spatial distribution of logistics firms in Paarden Eiland

5.1.2 Relationship to Transport Infrastructure

The findings indicate a strong correlation between the distribution of logistics firms and their proximity to essential transport infrastructure. The spatial layout of these firms highlights the critical role of accessibility to major transport nodes in their operational strategies. A network analysis of key transport routes reveals that logistics firms are strategically positioned near major arterial roads like the N1 national road and Marine Drive (R27) highways as shown in Figure 5.3, facilitate seamless connections to regional and national markets. This spatial mapping illustrates how these firms align themselves along these road corridors to optimise transport efficiency and reduce costs. Moreover, the proximity to rail infrastructure near the Port of Cape Town provides an alternative mode of freight movement, although its usage appears to be less significant in the analysed dataset. Overall, the findings highlight the importance of transport infrastructure in shaping the logistics landscape, influencing firm locations, and enhancing operational capabilities in the region.

5.3 Role of Land-Use Planning and Regulation

5.3.1 Zoning Regulations in Paarden Eiland

The zoning pattern in Paarden Eiland was identified using data from the City of Cape Town Open Data Portal (Figure 5.4). The predominant zoning in Paarden Eiland is “General Industrial 2”. Industrial zoning caters for manufacturing and general industrial land use which may affect the environment with hazardous or noxious land uses which need to be managed cautiously. Industrial development has specific waste management needs and road infrastructure (City of Cape Town, 2024). “General Industrial 2” zoning different subzonings accommodated a variety of built firms and there is a provision for consent uses associated with industrial activities (City of Cape Town, 2024). The data indicating the presence of logistics firms in the Paarden Eiland are consistent with the zoning regulations. The second predominant zoning in Paarden Eiland is “Open Space 2 – Public Open Space”. This zoning mostly caters for the buffer zone along the coastal edge to cater for environmental considerations. The least predominant zoning in Paarden Eiland is “Mixed Use 2”. Mixed-use zonings accommodate industrial, business and residential development (City of Cape Town, 2024). According to the Blaauwberg District Plan (District B) a gradual change of land use is foreseen in Paarden Eiland. Although Paarden Eiland is historically an industrial area, the analysis from the Spatial Development Plans suggests that it is suited to mixed-use development, including retail, offices and residential use as a result of its location attributes (City of Cape Town, 2023:276). According to the Table Bay District Plan (District A) general industrial development activity is retained in Paarden Eiland.

5.3.2 Land Use Patterns, Urban Form and Economic Infrastructure in Paarden Eiland

According to the findings from the Table Bay District Development Framework, Paarden Eiland is a distinctive industrial zone within the metropolitan area due to its proximity to the Port and higher-order routes (City of Cape Town, 2023: 275). The architecture in Paarden Eiland primarily consists of large industrial buildings, typically ranging from two to four storeys, which do not engage with the street at a

human scale (City of Cape Town, 2023: 275). These warehouses generally lack defined “front-of-house” and “back-of-house” areas, as they are created to facilitate efficient delivery activities. The large plot sizes in Paarden Eiland allow for fluctuations in commercial or industrial activity. For instance, a sizable warehouse on one erf can be divided into multiple smaller warehouses to allow for growth or changes in business cycles (City of Cape Town, 2023: 275). The area is surrounded by major road linkages that facilitate the transportation of goods to the hinterland areas (City of Cape Town, 2023: 275). Although access to freight routes is robust, the positioning between these infrastructure networks and the Canal limits options for outward expansion, except for the Transnet land across the N1, which could be open for redevelopment in the future. The road infrastructure industrial areas are designed to facilitate the movement of large freight trucks that are used for the delivery and distribution of manufacturing inputs and products (City of Cape Town, 2023: 276).



Figure 5.10: Zoning in Paarden Eiland

5.3.3 Socio-economic and Spatial Planning

Table 5.5: Municipal Documents Applicable to Paarden Eiland

Document Name	Document Content	“Paarden Island” Occurrences	“Maritime Cluster” Occurrences	“Logistics Cluster” Occurrences
1. City of Cape Town City Map Viewer Open Data Portal	Zoning data	N/A	N/A	N/A
2. City of Cape Town Table Bay District Plan 2012	Socio-economic and spatial planning data	23	0	0
3. City of Cape Town District Blaauwberg District Plan 2012	Socio-economic and spatial planning data	9	0	0
4. City of Cape Town Table Bay District Plan Documents (Volumes) 2023	Socio-economic and spatial planning data	Total = 148	Total = 10	Total = 2
Volumes				
4.1 Volume I: Baseline and Analysis Report (BaAR)		13	0	0
4.2 Volume II: District Plan Main Technical Report		15	0	1
4.3 Volume II: Main Technical Report - Executive Summary		4	0	0
4.4 Volume III: Implementation Plan		2	0	0
4.5 Volume IV: Technical Annexures		114	10	1

5. City of Cape Town District Blaauwberg District Plan Documents (Volumes) 2023		Total = 44	Total = 0	Total = 1
Volumes				
5.1 Volume I: Baseline and Analysis Report (BaAR)		22	0	0
5.2 Volume II: District Plan Main Technical Report	Socio-economic and spatial planning data	15	0	1
5.3 Volume II: Main Technical Report - Executive Summary		2	0	0
5.4 Volume III: Implementation Plan		2	0	0
5.5 Volume IV: Technical Annexures		3	0	0
6. CID Application Report	Urban management data	63	0	0
7. Business Plan for the Management of the Paarden Eiland City Improvement District 01 July 2016 -30 June 2021	Urban management data	32	0	0
8. Business Plan for the Management of the Paarden Eiland City Improvement District 01 July 2021 – 30 June 2026	Urban management data	53	0	0

Table 5.5 lists the spatial plans and technical reports containing socio-economic and spatial data applicable to Paarden Eiland. As mentioned in Chapter 4, Paarden Eiland suburb boundary spans across two Districts namely, Table Bay District and Blaauwberg Districts. The Paarden Eiland is

mentioned the most in Table Bay District Plans than Blaauwberg District Plans for both the 2012 and 2023 Spatial Development Frameworks. In 2012, Paarden Eiland was mentioned 23 times in Table Bay District and only 9 times in Blaauwberg District. In 2023, Paarden Eiland was mentioned 148 times in total from the Table Bay District SDF documents compared to only 44 times in the Blaauwberg District SDF documents. This indicates that there was more intentionality in the planning and development of Paarden Eiland in Table Bay District than in Blaauwberg District. The 2012 SDFs do not mention “marine cluster” or “logistics cluster”. This indicated that there was no intentional spatial planning concerning cluster development in 2012 unlike in 2023 where “maritime cluster” and “logistics cluster” are mentioned in the SDF documents. Table Bay District SDF mentions “maritime cluster” ten times and the “logistics cluster” twice. The logistics cluster is mentioned specifically in relation to proximity to the port (City of Cape Town, 2023:290). Blaauwberg District SDF makes no mention of “marine cluster” and mentions “logistics cluster” once. The content analysis shows that there is more land use planning related to cluster development in Table Bay which directly corresponds to the concentration of firms on the southern portion of Paarden Eiland unlike the northern portion of Paarden Eiland that falls under Blaauwberg District jurisdiction. The spatial plans highlight that that Paarden Eiland is strategically situated next to the Port, about 6 km from the Central Business District (CBD) and around 15 km from Epping Industrial. It’s positioning between the Port and the N1, Paarden Eiland serves as an entryway to the Blaauwberg District. Table Bay’s 2023 SDF acknowledge the significance of Paarden Eiland’s proximity to the port and confirms that the land use is predominantly used for light to medium industry that serves the port (City of Cape Town, 2023:271). The economic analysis from the 2023 SDF indicates Paarden Eiland’s significance as an industrial node that serves as a key distributor to maritime-related industries (City of Cape Town, 2023:272).

5.3.4 Maritime Cluster

The prevalence of logistics firms as discussed in section 5.4.1 supports the logistics needs of industrial development in various sectors of the Marine Cluster in Paarden Eiland. As mentioned in 5.4.2 The spatial distribution of logistics firms shows a geographic concentration of logistics firms on the southern portion of the site, this is directly related to concentrated effort for promoting the Paarden Eiland as an industrial area and part of a Maritime cluster as per the Table Bay District SDF unlike in the Blaauwberg District SDF which is the northern portion of Paarden Eiland. According to the Table Bay District SDF, a significant percent of the industry in Paarden Eiland is centred around a Maritime Cluster (City of Cape Town, 2023: 278). The boat-building cluster is situated in Paarden Eiland due to its excellent access to the Port, which facilitates launching, testing, and shipping abroad. Additionally, its proximity to other components of the value chain and ease of accessibility for staff, whether by train or private vehicles, though less so by MyCity buses thus providing a significant advantage (City of Cape Town, 2023: 278). According to the 2023 Table Bay District analysis, interviews with businesses in the Maritime Cluster in 2019 revealed that rezoning poses significant risks for companies operating in Paarden Eiland, as most businesses operate from rental properties, with Nautic and Veecraft being notable exceptions. Many boatbuilding companies face tenure insecurity due to short lease agreements (ranging from 2 to 5 years) with private property owners and Transnet, some of which offer renewal options while others do not. Additionally, numerous businesses have invested substantial capital; up to R20 million in the properties they lease, which would be at risk if their leases

are not renewed, particularly if landlords perceive they could receive more lucrative offers for their properties (City of Cape Town, 2023:279).

Cape Town's boatbuilding sector is the biggest in South Africa and competes globally with markets in the United States, Europe, and Africa. Besides the boatbuilders listed previously, Paarden Eiland harbours a comprehensive marine services and manufacturing supply chain that includes chandlery, ship repair, rig repair, maritime-focused mechanical engineering, wholesale of shipping components, and sectors related to fishing.

5.3.5 Urban Management in Paarden Eiland

The Eiland City Improvement District (PECID) has a rich history rooted in community collaboration and a commitment to enhancing the industrial environment. Initially, the Metro Industrial Township joined in 1972, leading to the formation of the Paarden Eiland & Metro Association (PEMA). This organisation focused on maintaining and improving the area, but it soon became clear that the voluntary membership model placed a disproportionate burden on those who paid fees, while others benefited without contributing (Paarden Eiland, 2024). To address this issue, property owners proposed the establishment of a City Improvement District (CID), where all owners would share the responsibility of funding improvements (City of Cape Town 2005). This led to the transformation of PEMA into PECID in 2005, following the approval of a formal application to the City of Cape Town. The shift to a Section 21 Company ensured that all property owners contributed financially to the district's upkeep, fostering a more equitable approach to community improvement (City of Cape Town, 2005, 2015, 2020).

The Paarden Eiland City Improvement District (PECID) was established in 2005 in terms of Section 8.1 of the By-law of the City of Cape Town following an application by property owners in the area (City of Cape Town, 2005). It was mandated by the Paarden Eiland and Metro Industria CID Steering Committee to establish a CID in the Paarden Eiland and Metro Industria area and that it be declared a CID subject to the approval of the Paarden Eiland and Metro Industria City Improvement District Management Committee (Section 21 company), in terms of Section 12 of the CID By-law (City of Cape Town, 2005). After eight months of delays with CIPRO and SARS, the CID officially began its work in March 2006.

The PECID, mandated by the CID Steering Committee, sought to create a unified strategy for the area, which officially launched in March 2006 after resolving administrative delays. This evolution reflects the ongoing commitment of local stakeholders to enhance the economic and physical landscape of Paarden Eiland, building on a legacy with Paarden Eiland industrialists ratepayers in 1947 by influential local figure Louis Glassman (City of Cape Town, 2015). Through collaborative efforts, PECID continues to shape the development and sustainability of the region, fostering a thriving industrial community.

Cape Town is planning to establish a permanent desalination plant with a capacity of up to 70 million litres per day (MLD) in Paarden Eiland, specifically on Erven 15201-RE, 16387, and 14809. This site is conveniently located next to the Transnet National Port Authority (TNPA) container staging area and near the interchange of the N1 and R27 highways, facilitating access via Nereide Street (Zutari, 2024).

The project will include key infrastructure components such as seawater intake and concentrate outfall pipelines, which will utilise the existing concrete seawater canal system to transport seawater from the intake point to the Port of Cape Town and into Table Bay. The seawater intake will be situated approximately 1.27 km offshore, ensuring efficient water sourcing for desalination (Zutari, 2024). For the concentrate outfall, two alternatives are being explored. The first option is positioned 1.12 km offshore in a northerly direction, while the second option is 1.25 km offshore in a north-northeast direction, located 357 meters east of the first alternative. This careful planning reflects the City's commitment to addressing water supply challenges while considering environmental impacts and infrastructure integration (Zutari, 2024).

5.4 Discussion of Findings

5.4.1 Analysis of the Mix of Logistics Forms

5.4.1.1 Types of Firms

Understanding the various logistics firm typologies is crucial for evaluating their roles within port ecosystems. Broadly, logistics firms can be categorised into three primary types: freight forwarders, third-party logistics (3PL) providers, and transportation companies. Freight forwarders act as intermediaries, overseeing goods transit from origin to destination, and ensuring compliance with regulatory requirements. They are pivotal for shippers, particularly in regions like the Greater Golden Horseshoe in Canada, where logistics firms are influenced by specific location determinants such as transport access and land costs (Jakubicek, 2010). 3PL providers take this a step further, offering integrated services that encompass warehousing, distribution, and supply chain management, increasingly relying on digital technologies to enhance operational efficiencies (Chen et al., 2024). Transportation companies, meanwhile, focus primarily on the movement of goods via various modes—road, rail, air, and sea. Their integration and spatial clustering near ports, as seen in Gothenburg, illustrate how proximity to transport hubs is essential for enhancing operational efficiency and competitiveness (Vitellaro et al., 2021). Each type of logistics firm plays a distinct but interconnected role, contributing to a harmonious logistics network that supports economic growth and enhances the functionality of port logistics systems.

The observed mix of types of logistics firms in the case study aligns with the strategic significance of Paarden Eiland's location. Proximity to the Port of Cape Town facilitates freight and warehousing operations, which rely heavily on seamless connections to shipping routes. The predominance of distributors validates the area's function as a bridge between the port and broader markets within the City of Cape Town and beyond. While smaller in proportion, Couriers reflect the adaptation of logistics clusters to contemporary market demands, such as e-commerce and time-sensitive delivery services. Firms' diversity also highlights agglomeration economies' role in Paarden Eiland. Businesses benefit from shared infrastructure, proximity to key transport routes, and synergies among firms, such as

those between warehousing and freight operators. However, the relatively smaller representation of specialised services like packaging and movers points to potential areas for strategic development.

5.4.1.2 Freight Forwarders and Their Functions

Operating as vital intermediaries in the logistics network, freight forwarders play an essential role in managing the complex processes involved in transporting goods across international borders. These professionals not only consolidate shipments from various suppliers but also arrange for a multitude of services, including documentation, customs clearance, and insurance. Their expertise in navigating the intricate regulations of global trade is invaluable, ensuring compliance and minimising delays. As highlighted by research on logistics firms, particularly around critical locations such as ports, the function of freight forwarders is increasingly supported by modern technologies and data analytics, which facilitate real-time tracking and scheduling (Heitz et al., 2020). This technological integration is crucial in addressing the challenges posed by increased traffic and congestion in port areas, which can significantly impact logistics efficiency (Cooper et al., 2024). Ultimately, freight forwarders enhance connectivity between businesses and their supply chains, playing a pivotal role in optimising logistics operations while contributing to overall economic growth.

5.4.1.3 Third-Party Logistics (3PL) and Fourth -Party Logistics (4PL) Service Providers

In contemporary logistics, the role of Third-Party Logistics (3PL) providers has gained significant prominence due to the complexities of supply chain management. By outsourcing logistics activities to specialised firms, businesses can enhance efficiency and focus on their core operations. 3PL providers offer a diverse range of services, including warehousing, order fulfilment, and transportation management, all of which are crucial for optimising supply chains near strategic locations such as ports. Logistics firms increasingly prefer proximity to transport hubs, confirming that access to ports influences the distribution of logistics services (Holl et al., 2017). The integration of advanced technologies within 3PL services facilitates real-time tracking and inventory management, informing decision-making processes and enhancing service delivery (Verhetsel et al., 2015). Warehousing firms offer storage solutions for goods, and often act as intermediate points between production and distribution. These firms support bulk storage and handling for port-based activities. Freight companies facilitate the transportation of goods, often by road or multimodal links, including container freight services critical for exports and imports through the port. Distributor firms focus on moving goods from producers or warehouses to retailers or end-users, ensuring efficient supply chain connectivity. Distributors and suppliers are the most prominent typologies of firms in Paarden Eiland because they have the most incentive to be located near multimodal transport interchanges offered by the port environment based on the reasons discussed in section 2.4.2 in the literature chapter. Transportation conditions, including accessibility to and from warehouses and infrastructure for delivering goods, significantly influence location choices for logistics firms near ports (De Oliveira *et al.*, 2020; Sakai, 2020). Transportation and lead time are affected by the distance between industrial locations and ports. Logistics companies that deal with container transportation and large volumes of products will

place a larger value on port infrastructure and multimodal accessibility than those that do not. This is this is due to the fact that these firms are typically more globally orientated (Chang and Lin, 2015).

Courier operators specialise in last-mile delivery, catering to e-commerce and time-sensitive logistics needs and are least prominent typology of logistics firms in Paarden Eiland. The presence of only one courier company in Paarden Eiland confirms the global observations of shifts in logistics firms land use patterns near ports, e-commerce and decentralisation of delivery as discussed in subsections 2.2.1-2.2.3 of the literature review chapter. . According to Tiupysheva et al (2023), logistics are a crucial hub in the supply chain, emphasising the transformation of warehouse into transshipment points. Tiuoysheva et al (2023) highlight the importance of efficient management and innovative solutions to meet the growing demands of e-commerce and consumer society. These firms facilitate export and import activities.

Other typologies of firms in Paarden Eiland such as movers, suppliers, packaging, and other firms play complementary roles, such as equipment provision and support services, referred to as value-added services in logistics literature. The finding showed that several logistics firms in Paarden Eiland are classified under multiple typologies, indicated by clusters of different coloured symbols at one location. This suggests a diverse range of services provided by these businesses, combining elements. A firm having multiple typologies can reflect a flexible business model, allowing these companies to meet various customer needs, optimise operations, and adapt to market demands. As mentioned in section 2.4.2.1, third-party logistics providers (3PL) and fourth-party logistics providers (4PL) integrate all of the abovementioned services (Domingues et al., 2015). Third-party logistics mostly deal with basic logistics activities and can be valuable in developing a client's supply chain (Domingues et al., 2015). Third-party logistics' growing importance worldwide allows the provision of fast pace services of various services to firms from all sectors to encourage them to reduce costs, focus on their differentiating activities and consequently to enable them to achieve higher performance (Domingues et al., 2015). The research results indicate a strategic advantage in Paarden Eiland, facilitating comprehensive service offerings (3PL and 4PL) in proximity to key transport infrastructure.

As discussed in section 2.2.1: Spatial Shifts in Logistics Activities, certain firms located near will eventually lose their multinational role as logistics concepts evolve towards central coordination and more decentralised physical distribution, to be replaced by logistics operations that have a more regional role and more robust or strong integration with production activities (van de Lugt and de Langen, 2005). This could explain the disproportionate typologies of firms certain firms in the case study, however it can not be confirmed because of the third limitation of the study stated in section 1.5.2 of the Chapter 1. The implication of this is that ports face competition from inland locations for value-added logistics activities. The case of logistics developments provides a basis for analysing the increasingly important questions "What logistics activities can ports attract?" and "What is the appropriate strategy to result in this?" (van de Lugt and de Langen, 2005).

5.4.1.4 Relevance of Economic Activity Mix and Logistics Firm Typologies in Paarden Eiland and proximity to the Port of Cape Town

It is established in the literature that logistics firms play in enhancing operational efficiency and fostering resilience within maritime ecosystems. As the sector evolves, characterised by profound environmental, social, and technological challenges, the integration of varied typologies becomes essential. Empirical studies highlight that strategic stakeholder practices not only mitigate risks but also unlock profitability, illustrating that behaviours such as entrepreneurial orientation and distribution logistics directly influence financial outcomes (Vitellaro et al., 2021). Consequently, recognising the diverse functions of logistics firms near ports is critical, as it allows for tailored strategies that leverage unique strengths and address specific challenges. This holistic perspective ultimately advocates for a synergistic approach, ensuring that all actors contribute to a robust maritime logistics framework.

5.4.1.5 Role in Supply Chain

As discussed in Chapter 2, logistics firms serve as vital intermediaries within the framework of supply chain management, orchestrating the movement of goods from suppliers to consumers. These firms are responsible for a myriad of tasks, including inventory management, transportation planning, warehousing, and distribution, ensuring that products are delivered in a cost-effective and timely manner. As highlighted by (Tiwari et al., 2003), firms often prioritise transportation infrastructure in their location choices, underscoring the significance of accessibility to ports and transport networks as key determinants in operational efficiency. With the evolving dynamics of global trade, logistics firms adapt to shifting market demands and technological advancements, thereby enhancing their roles in coordinating complex supply chains. According to Vitellaro et al., (2021) in their study of the examination of stakeholder management in maritime logistics ecosystems emphasise the that collaborative efforts of logistics firms in engaging with multiple stakeholders are essential for fostering competitive advantages and addressing emerging challenges in supply chains. Ultimately, these firms are instrumental in optimising supply chain processes, reducing lead times, and maximising the overall responsiveness of the logistics network.

5.4.2 Spatial Distribution of Logistics Firms: Geographic Concentration and Patterns

5.4.2.1 Geographic Concentration Pattern of Logistics Firms in Paarden Eiland

In the context of the Port of Cape Town, Paarden Eiland emerges as a significant concentration point for logistics firms due to its strategic location, facilitating seamless transportation and distribution networks. The findings in Paarden Eiland corroborates the trends in the literature review as discussed in Chapter 2, section 2.4.2. The analysis highlights patterns of proximity, agglomeration, resource

allocation (CID), and infrastructural development, a clearer understanding of the factors influencing logistics operations in Paarden Eiland. The clustering of logistics firms in Paarden Eiland near the Port of Cape Town significantly enhances their operational efficiencies. This geographic concentration permits companies to leverage shared resources, such as transportation infrastructure and access to a skilled labour pool, fostering a synergistic environment that reduces overall costs, resulting in firms benefiting from port-centric clusters as discussed in the Chapter 2, section 2.6.3. Proximity to the port facilitates streamlined supply chains, allowing for faster turnaround times and improved responsiveness to market demands. Firms located in this area can also benefit from collaborative initiatives and knowledge sharing, which often leads to innovation in logistics practices. However, this clustering can also lead to increased competition for limited resources, necessitating strategic planning and engagement among firms to mitigate potential congestion and inefficiencies. Ultimately, the strategic geographic positioning of these logistics firms not only amplifies their individual operational efficiencies but also contributes to a more dynamic and responsive logistics ecosystem in the region (Mokhele and Fisher-Holloway, 2024). The association between the theory of economies of agglomeration and that of supply chains is not a common one. Alexandru (2013) explains that this is primarily because of the contrasting composition of the two theories, one stresses the importance of geographical proximity, and the other stresses the global network (Alexandru, 2013:47). Supply chains have been restructured in response to the global economy, changing consumer behaviour, and rapid advances in technology, communication, and logistics management (Kang, 2018; Sakai et al., 2015, Sakai et al., 2017).

5.4.2.2 Relationship to Transport Infrastructure

Several factors influence the location of logistics firms in close proximity to the Port of Cape Town, particularly in areas like Paarden Eiland. One major determinant is accessibility; firms prioritise locations that offer efficient transport links to the port, allowing for rapid movement of goods. This preference is evident from the observed spatial mismatch where investment tends to bypass lower-income areas in favour of more affluent suburbs, leading to inadequate access for businesses reliant on logistics (Shilpi et al., 2018). Moreover, the dynamics of property markets play a significant role, as firms assess not just the cost of space but also the potential for growth. Areas like the Voortrekker Road Corridor, traditionally seen as vital for economic infrastructure, face challenges due to competing development nodes that further complicate the logistics landscape (Myers et al., 2013). Consequently, a combination of infrastructural access, economic trends, and market conditions shape where logistics firms ultimately establish their operations.

5.4.2.3 Alignment with Economic Development Areas and Corridors

The geographic concentration of logistics firms in Paarden Eiland exemplifies a strategic alignment with Cape Town's industrial development, particularly concerning spatial disparities seen in other regions of the city. The dynamics of spatial distribution reveal significant patterns that influence economic activity, particularly in logistics. In Cape Town, the geographic concentration of logistics firms near the port of Paarden Eiland exemplifies how proximity to infrastructure affects operational

efficiency and accessibility to markets. Businesses are attracted to this area due to its proximity to critical transport hubs, as highlighted by the inefficiencies faced by unskilled workers commuting from peripheral neighbourhoods to industrial areas (Myers, 2013). While the Voortrekker Road Corridor has been cited as a potential economic backbone for the city, emerging development patterns suggest a shift in focus towards the northern peripheries, which are witnessing more rapid growth (Myers, 2013). This trend highlights the importance of location for logistics firms, as they seek to minimise transportation costs and optimise service delivery. Therefore, firms situated in Paarden Eiland are well-positioned to leverage logistical efficiencies that not only enhance their competitiveness but also contribute to alleviating some of the spatial disparities impacting the workforce in Cape Town. Transportation conditions, including accessibility to and from logistics firms and infrastructure for delivering goods, significantly influence location choices for logistics firms near ports (De Oliveira et al., 2020; Sakai, 2020). In the role of key elements of international supply networks, companies located in ports become virtually dependent on the activity of the networks they belong to (Alexandru, 2013: 46). In the case of port economic agglomerations, there is a shift of analysis from the firms in the system to the system of firms (Alexandru, 2013: 46).

5.4.3 Role of Land Use Planning Regulation

5.4.3.1 Land Use Planning and Regulation

Land use planning regulations play a significant role in shaping the logistics landscape, particularly in proximity to ports, which are characterised by multimodal transportation and economic nodes. Land use regulations serve as both a framework for planning and a catalyst for fostering a competitive and sustainable logistics sector adjacent to major ports, thereby enhancing regional economic vitality. According to the City of Cape Town land use zoning scheme, the predominant zoning in Paarden Eiland is General Industrial 2. Land use planning regulations facilitate the optimal locations for logistics firms, particularly near ports where proximity to transport hubs can significantly influence operational efficiency. These regulations not only facilitate the allocation of land for various logistics activities but also ensure that such activities align with broader urban development goals. Consequently, well-structured land use regulations can help balance the needs of logistics firms with community and environmental interests, promoting sustainable development while ensuring that firms benefit from strategic locations that enhance their competitiveness in the global market.

The classification of logistics firms is essential for understanding their diverse roles and strategic choices within the supply chain. Logistics firms can be categorised into three primary typologies: asset-based, non-asset-based, and hybrid models. Asset-based logistics firms own and operate their transportation and warehousing facilities, offering robust service levels and significant control over their operations (Vitellaro et al., 2021). Conversely, non-asset-based firms rely on third-party carriers and storage providers, allowing flexibility but potentially creating vulnerabilities in service consistency. Hybrid models, increasingly prevalent in contemporary logistics ecosystems, blend characteristics from both asset and non-asset-based firms (Vitellaro et al., 2021). This blend not only reflects a strategic adaptation to shifting market demands but also highlights the necessity for firms to align closely with their stakeholders, as evidenced in the discourse surrounding stakeholder management

within maritime logistics ecosystems (Vitellaro et al., 2021). Ultimately, the typology employed can significantly influence a firm's location choice, especially in proximity to ports, as varied logistics operations respond differently to land use planning regulations (Brown et al., 2019).

5.4.3.2 Regulatory Incentives: City Improvement Districts and Special Rating Areas

City Improvement Districts are essentially geographic areas in which the majority of property owners determine and agree to fund supplementary services to those normally provided by their local authority, in order to maintain and manage the public environment at a superior level (South African Cities Network, 2021). Through legislation, the cost of the provision of services is then spread over all property owners within the specified geographic area. Unlike rates, funds contributed by the property owners may only be spent in the area in which they are collected. While the local authority continues to provide normal services, the additional rates contributed by property owners are collected by Council and paid over to the CID. These funds are then used by the CID to provide a “top-up” to Council services, general maintenance, safety and security, environmental enhancement and marketing of the area. Many South African towns, cities and urban nodes continue to display various levels of deterioration and most local authorities struggle to deal with the impact of urbanisation and limited resources, the establishment of City Improvement Districts (CIDs), or Special Rating Areas (SRAs), has become an effective solution to halt environmental degradation and unacceptably high degrees of crime (South African Cities Network, 2021). CIDs and SRAs are variants of SEZ discussed in Chapter 2, section 2.7. As discussed in chapter 2, in numerous developing countries, SEZs can manifest in various forms, such as industrial parks or integrated logistics hubs and have become essential instruments for promoting economic growth (Li and Wang, 2021). There is currently a rise of the prevalence of industrial parks and SEZs is on the rise in Southeast Asian nations, as well as in regions of Africa and Italy in Europe (Ruocco, 2023).

The Paarden Eiland City Improvement District (PECID) exemplifies a successful strategy for addressing urban challenges in industrial zones through collaboration between property owners and municipal authorities. Established in 2005, the PECID is funded by special levies (additional rates) collected from property owners, focusing on improving safety, cleanliness, and environmental standards within its boundaries. Key elements of PECID's approach are the fiscal and operational management. Financial control is central to the PECID's effectiveness, with most funds allocated to security and cleaning services. Investments include a surveillance system, contracted ground patrols, and an environmental team. Strategic Goals (2016–2021) include maintaining a clean and safe industrial environment, fostering strong collaboration with local authorities and service providers, preserving Paarden Eiland's identity as a prime industrial location and promoting innovative management practices. The CID aligns its objectives with the Cape Town Integrated Development Plan (IDP). It operates under the Special Ratings Area (SRA) By-law, adhering to city policies to avoid exacerbating inequities. The CID has since fostered a transformation, creating a safer, cleaner, and more attractive industrial hub. This has drawn new investments, bolstered the area's economic vitality, and preserved its unique character. Through its ongoing commitment to development goals, PECID

demonstrates the potential of public-private partnerships to revitalise and manage urban spaces, ensuring sustainable and inclusive growth.

5.5 Summary

Chapter 5 has explained the economic activity mix and typology of logistics firms in Paarden Eiland. The analysis identified key categories, including freight forwarders, third-party logistics providers, and transportation companies, each contributing uniquely to the port ecosystem. The chapter highlighted the significant impact of geographic clustering, with firms benefiting from proximity to key transport infrastructures, enhancing operational efficiency and fostering a dynamic logistics environment. Additionally, land use planning and regulatory frameworks, such as City Improvement Districts, were shown to play a crucial role in shaping the logistics landscape, promoting sustainability and competitiveness. The findings demonstrate the interplay of economic activities and regulatory incentives in driving logistical synergies in Paarden Eiland. Based on the findings, Chapter 6 provides synthesis of findings and contributions to practice.

Chapter 6: Synthesis of Findings and Contribution to Practice

6.1 Contribution to Practice

The contributions of the study are the empirical findings on Paarden Eiland located adjacent to the Port of Cape Town. The findings can inform ongoing spatial planning policy revisions concerning logistics, supply chain management, and land-use planning in port cities such as Cape Town. This study makes practical contributions to the analysis and understanding of the logistics economic activities within port-city contexts, particularly focusing on the Paarden Eiland area adjacent to the Port of Cape Town. The research explained and analysed the of mix and spatial distribution of logistics firms operations and the role of land use planning in Paarden Eiland. The mixed methods and single-case study approach allows for a nuanced examination of the mix and spatial distribution of these firms, as well as the regulatory influences that shape their activities. The integration of both descriptive and explanatory methodologies contributed to context-specific knowledge and descriptive statistics of the study area. The knowledge and analysis of the study area contribute to understanding logistics operations trends in port cities, thus contributing to testing theoretical and context-specific knowledge production for the maritime cluster centred on the Port of Cape Town. The study also contributes to planning practice and the development of practical solutions and amendments in land-use management and spatial for the future to improve the facilitation of a PLC in the vicinity of the Port of Cape Town, particularly for the northern portion of the site (under Blaauwberg District jurisdiction) which is lagging in comparison to the southern portion of the site (under Table Bay District jurisdiction). From the content analysis, section 5.3.3 is evident that the Table Bay District SDFs have been more explicit in spatial planning concerning Paarden Eiland and developing maritime and logistics clusters than the Blaauwberg District SDFs. Blaauwberg District has an opportunity of capitalising on the maritime and logistics cluster development facilitated by Table Bay District. The Paarden The study's context-specific findings offer an opportunity for developing a framework for exploring broader theoretical implications regarding port-city relations and logistics agglomeration amidst technological shifts in global trade and supply chains. By focusing on Paarden Eiland, this research serves as a confirmatory study that may resonate with similar port-city interrelations globally, on how ports are increasingly becoming integrated platforms for economic activities in emerging markets and influence current policy amendments.

The study emphasises the pivotal role of geographic proximity to transport infrastructure in shaping the operational strategies of logistics firms. The findings indicate that the clustering of firms near key transport nodes allows for shared resources, operational efficiencies, and enhanced service delivery facilitated by economic infrastructure and collaboration in City Improvement Districts. This finding confirms an understanding of agglomeration economies and the collaborative advantages that firms can derive from their strategic placements.

The study also highlighted the importance of land-use planning and regulatory frameworks in fostering a conducive environment for logistics operations. By analysing the zoning patterns in Paarden Eiland, the research provided explanatory content analysis of how regulatory incentives, such as City Improvement Districts, can facilitate improved safety, cleanliness, and operational standards, ultimately enhancing the attractiveness of the industrial hub, and making it an ideal location for logistics firms despite changing global trends.

6.2 Conclusions

6.2.1 Research Objective 1

The study answered the research questions and achieved the objectives outlined in section 1.3. The data for the first research question “What is the mix of the logistics firms located in Paarden Eiland, in the vicinity of the Port of Cape Town?” was presented in section 5.1 and further analysed section 5.4.1. The presentation of the data and discussion of the findings in section 5.4.1 fulfilled the objective of analysing the mix of logistics-related firms located in Paarden Eiland, in the vicinity of the Port of Cape Town. The logistics landscape in Paarden Eiland reflects the strategic advantages afforded by its proximity to the Port of Cape Town, enabling efficient freight and warehousing operations reliant on direct shipping connections. The prevalence of distributors indicates the area's role as a conduit for goods between the port and regional markets. Couriers, though fewer, signify an adaptation to modern demands such as e-commerce and expedited delivery services. This diversity of logistics firms shows the significance of agglomeration economies, where businesses benefit from shared infrastructure and proximity to transport routes (Heitz et al., 2020). Understanding the classification of logistics firms is crucial for evaluating their roles and strategic decisions within the supply chain. Firms can be categorised into three main types: asset-based, non-asset-based, and hybrid models. Asset-based firms maintain ownership and operation of their transportation and warehousing facilities, which allows for enhanced service levels and operational control (Vitellaro et al., 2021). In contrast, non-asset-based firms depend on third-party carriers and storage, offering flexibility at the expense of potential service consistency. Hybrid models combine elements from both asset and non-asset-based firms, reflecting the need for strategic adaptability in response to evolving market conditions (Vitellaro et al., 2021). The choice of logistics typology significantly influences location decisions, with firms adapting their operations to comply with varying land use regulations (Brown et al., 2019).

Freight forwarders emerge as key players in the logistics network, managing complex international transportation processes, including documentation and customs clearance (Cooper et al., 2024). Their operations are increasingly bolstered by advanced technologies that enhance tracking and scheduling, responding to the logistical challenges posed by port congestion (Heitz et al., 2020). Furthermore, Third-Party Logistics (3PL) providers play a pivotal role in enhancing supply chain efficiency by outsourcing logistics functions, thereby allowing firms to concentrate on core activities. Proximity to transport hubs facilitates the optimisation of logistics services (Holl et al., 2017).

Warehousing and freight companies function as critical transitional points in the supply chain, allowing for bulk storage and the movement of goods via various transport modes. The prominence of distributors in Paarden Eiland indicates their incentives to locate near multimodal transport interchanges (De Oliveira et al., 2020). The significance of access to ports is echoed in the operations of firms focused on container transport, which place a premium on multimodal accessibility (Chang and Lin, 2015).

While courier firms remain the least represented typology in Paarden Eiland, they illustrate broader trends in logistics towards decentralisation and e-commerce adaptation (Tiupysheva et al., 2023). Additional logistics entities, such as movers and packaging services, contribute value-added functions that complement the core logistics activities. This multiplicity of firm typologies suggests a flexible operational model capable of catering to diverse customer needs and adapting to fluctuating market demands (Domingues et al., 2015).

The evolution of logistics concepts indicates a shift from multinational logistics roles to more decentralised operations with stronger regional production integration (van de Lugt and de Langen, 2005). This shift raises pertinent questions regarding the competitive positioning of ports in attracting value-added logistics activities. It is essential to comprehensively understand how logistics firms enhance operational efficacy and resilience within maritime ecosystems, especially amidst environmental, social, and technological challenges (Vitellaro et al., 2021). Collaboratively leveraging the diverse functions of logistics firms is crucial for establishing a robust maritime logistics framework, ultimately driving supply chain optimisation and responsiveness (Tiwari et al., 2003).

6.2.2 Research Objective 2

The data presented for the second question; “How are the logistics firms spatially distributed in Paarden Eiland?” was presented in section 5.2 and further analysed in section 5.4.2. The presentation of the data and discussion of the findings fulfilled the objective of analysing the spatial distribution of logistics-related firms in Paarden Eiland. Paarden Eiland has emerged as a critical concentration area for logistics firms, closely linked to its advantageous positioning near the Port of Cape Town. This geographical placement enhances transportation and distribution networks, corroborating trends identified in the literature review (Chapter 2, section 2.4.2). The analysis shows that factors such as proximity, agglomeration, and infrastructural development significantly influence logistics operations in the area. Clustering logistics firms near the port boosts operational efficiencies by allowing for shared resources, including transportation infrastructure and access to a skilled workforce. This synergy helps mitigate costs and enhance supply chain responsiveness, facilitating quicker turnaround times and fostering collaborative innovation among firms (Mokhele and Fisher-Holloway, 2024). However, such clustering may also instigate increased competition for limited resources, necessitating strategic planning among firms to alleviate congestion (Mokhele and Fisher-Holloway, 2024). The correlation between economies of agglomeration and supply chain theory is notably underexplored; Alexandru (2013) suggests this is due to the differing emphases of these theories such as prioritising geographical closeness and focusing on global networks. The restructuring of supply chains,

influenced by global economic shifts, consumer behaviour, and technological advancements, further complicates these dynamics (Kang, 2018; Sakai et al., 2015; Sakai et al., 2017).

The location of logistics firms close to the Port of Cape Town, particularly in Paarden Eiland, is significantly shaped by transport accessibility. Efficient transport links are essential for the swift movement of goods, with investment often bypassing lower-income areas in favour of wealthier suburbs, creating spatial mismatches for logistics-dependent businesses (Shilpi et al., 2018). Established economic corridors, such as the Voortrekker Road Corridor, face challenges due to competing development zones, complicating the logistics environment (Myers et al., 2013). Thus, logistics firms' location choices are influenced by a mix of infrastructural access, economic trends, and market conditions.

The concentration of logistics firms in Paarden Eiland illustrates a strategic alignment with Cape Town's industrial development, highlighting spatial disparities within the city. The proximity of these firms to critical transport hubs enhances their operational efficiency and market accessibility. This is particularly important for unskilled workers commuting from peripheral areas to industrial sites, underscoring the dynamics of spatial distribution in economic activity (Myers, 2013). Although the Voortrekker Road Corridor has been identified as a potential economic cornerstone for Cape Town, recent focus appears to be shifting towards rapidly developing northern areas (Myers, 2013).

As logistics firms aim to minimize transportation expenses and maximise service delivery, those situated in Paarden Eiland effectively leverage logistical efficiencies, thereby improving their competitiveness and addressing spatial disparities within the workforce in Cape Town. Transportation conditions, including access to logistics facilities and distribution infrastructure, fundamentally influence these firms' location choices (De Oliveira et al., 2020; Sakai, 2020). Moreover, firms located in port-centric economic agglomerations rely heavily on the networks they are part of, marking a transition from a firm-centric analysis to a systems approach regarding the interconnected roles of firms (Alexandru, 2013).

6.2.3 Research Objective 3

The data for the third research question; "What is the role of land-use planning and regulation in influencing the mix and placement of logistics firms in Paarden Eiland?" was presented in section 5.3 and the discussion of the findings is presented in section 5.4.3. The presentation of the data and discussion of the findings fulfilled the objective of analysing the role of land-use planning in influencing the mix of logistics firms in Paarden Eiland. Land use planning regulations are fundamental in shaping the logistics environment surrounding major ports, which serve as crucial multimodal transportation and economic nodes. These regulations provide a structured framework that enhances the competitiveness and sustainability of the logistics sector, contributing positively to regional economic vitality. In Paarden Eiland, the City of Cape Town designates the predominant zoning as General Industrial 2, facilitating the optimal placement of logistics firms. Such proximity to transport hubs not only improves operational efficiencies but also aligns logistics activities with wider urban development objectives. By effectively balancing the needs of logistics firms with community and environmental

considerations, land use regulations promote sustainable development, ultimately enabling firms to thrive in strategically advantageous locations (Vitellaro et al., 2021).

City Improvement Districts (CIDs) represent geographic areas where property owners collaboratively fund enhanced services beyond those provided by local authorities, aimed at maintaining and improving the quality of public spaces (South African Cities Network, 2021). This funding mechanism allows property owners to invest in their localities, resulting in better maintenance, safety, security, and environmental improvements. In South Africa, many urban areas face challenges of deterioration and urbanisation, and the establishment of CIDs has proven an effective solution to combat crime and environmental degradation (South African Cities Network, 2021). The Paarden Eiland City Improvement District (PECID) is a notable instance of this approach, initiated in 2005 to address urban challenges through collaboration between property owners and municipal authorities. Funded by special levies from property owners, PECID focuses on enhancing safety, cleanliness, and environmental standards within its area. Key components of PECID's strategy include financial management, enhanced security measures, and operational improvements, all aimed at preserving the area's industrial character while fostering development (PECID, 2016–2021). The CID aligns its objectives with the Cape Town Integrated Development Plan, operating under the Special Ratings Area (SRA) By-law to ensure equitable policies. The successful execution of PECID's goals has resulted in significant urban transformation, attracting new investments and elevating the economic vitality of Paarden Eiland. This illustrates the efficacy of public-private partnerships in revitalising urban spaces and promoting sustainable growth (Ruocco, 2023).

The research achieved the aim of the study which was to analyse the agglomeration of logistics firms in Paarden Eiland, in the vicinity of the Port of Cape Town. The study revealed the role of geographic proximity to transport infrastructure in shaping the operational strategies and locational choice of logistics firms. The findings indicate that the clustering of firms near the port and key transport nodes allows for shared resources, operational efficiencies, and enhanced service delivery facilitated by economic infrastructure and collaboration in City Improvement Districts. This finding confirms an understanding of agglomeration economies and the collaborative advantages that firms can derive from their strategic placements.

The study also highlighted the importance of land-use planning and regulatory frameworks in fostering a conducive environment for logistics operations. By analysing the zoning patterns in Paarden Eiland, the research provided explanatory content analysis of how regulatory incentives, such as City Improvement Districts, can facilitate improved safety, cleanliness, and operational standards, ultimately enhancing the attractiveness of the industrial hub, and making it an ideal location for logistics firms despite changing global trends.

6.3 Recommendations

To enhance the operational efficiency of logistics firms in Paarden Eiland, stakeholders should promote the diversification of firm typologies. Encouraging the presence of asset-based, non-asset-based, and hybrid logistics firms can foster a competitive environment that aligns with modern market demands, particularly e-commerce. This can be achieved by implementing strategies that incentivise

firms to invest in diverse logistics models, facilitating shared infrastructure, and resources. Furthermore, regular assessments of firm classifications should be conducted to ensure adaptive responses to evolving market conditions, ultimately fostering resilience within the logistics sector (Vitellaro et al., 2021; Brown et al., 2019). This recommendation applies to the first research question and findings.

Given the spatial concentration of logistics firms in Paarden Eiland, urban planners should prioritise the enhancement of transport accessibility to mitigate competition for limited resources while maximising service delivery. This could involve investing in transport infrastructure that connects lower-income areas with logistics hubs, ensuring equitable access for unskilled workers commuting to industrial sites. Strategic collaborations among logistics firms should also be encouraged to promote resource sharing and innovation, thereby boosting operational efficiencies and responsiveness to market changes (Mokhele and Fisher-Holloway, 2024; Shilpi et al., 2018). This recommendation applies to the second research question and findings.

The findings of this study showed role of land-use planning and regulatory frameworks in shaping the logistics landscape of Paarden Eiland but more can be done to develop port-centric logistics clusters through more specific policy intentions and incentives. It is recommended that local government entities continuously review and adapt land-use policies to support the dynamic needs of the logistics sector and port-centric cluster development. The periodic evaluation of the impact of CIDs and other policy incentives on the operational efficacy of logistics firms should also be undertaken to inform future planning of port development and land use planning in the vicinity of the port and port-city interface. This recommendation applies to the third research question and findings.

Summatively, the study recommends adaptive approaches that consider the impact of the growth and evolution of logistics and supply chain management and the operational strategies of logistics firms through effective land-use planning and port development to improve the collaboration between port-centric cluster development and urban and regional planning in the City of Cape Town.

6.4 Areas for Further Research

Future research could investigate additional case studies or use a multiple-case study approach to assess the relevance of the findings. As logistics is an ever-evolving sector, continuous research is necessary to keep pace with technological advancements and changing market conditions. The findings in this study, particularly regarding firm typologies and spatial distributions, may benefit from further research through quantitative methods or comparative case studies in different geographic contexts. As logistics is an ever-evolving sector, continuous research is necessary to keep pace with technological advancements and changing market conditions. The findings in this study, particularly regarding firm typologies and spatial distributions, may benefit from further research through quantitative methods or comparative case studies in different geographic contexts.

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Annexure A

Ethics Approval

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13 August 2024

Ms Kwena Letsoalo
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Reference no: 223233307/2024/8

Project title: Spatial economic analysis of the port of Cape Town and its environs

Approval period: 13 August 2024 – 31 December 2025

This is to certify that the Faculty of Informatics and Design Research Ethics Committee of the Cape Peninsula University of Technology approved the methodology and ethics of Ms Kwena Letsoalo (223233307) for the Master of Urban and Regional Planning.

Any amendments, extensions or other modifications to the protocol must be submitted to the Research Ethics Committee for approval.

The Committee must be informed of any serious adverse event and/or termination of the study.



Prof L.J. Theo
Chair: Research Ethics Committee
Faculty of Informatics and Design
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