



The ship repair industry in the Eastern Cape: Economic impact and future development

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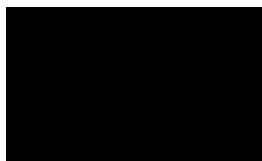
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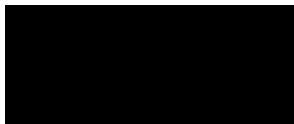


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ABSTRACT

The ship repair industry is a vital part of the global maritime value chain, ensuring vessel safety, regulatory compliance, and the smooth flow of international trade. In South Africa, the Eastern Cape is strategically located along major shipping routes and hosts three key ports: East London, Port Elizabeth, and Ngqura. Despite this strategic advantage, the region's ship repair sector remains significantly underdeveloped relative to its potential. This study examines the economic role and development prospects of the ship repair industry in the Eastern Cape, focusing on how port activity patterns influence repair demand and investment opportunities.

A quantitative desktop research approach was used to analyse secondary data on vessel arrivals and cargo handled at the three ports from 2015 to 2024, using a descriptive, trend-based framework to assess port functionality and implications for repair demand across vessel and cargo types.

Findings reveal functional differentiation within the Eastern Cape port system. Port of Ngqura serves large, technically complex vessels handling dry bulk and containerised cargo, generating lower-frequency but higher-value repair demand. Port of Port Elizabeth operates as a multi-purpose port with sustained activity across various vessel and cargo categories, supporting a wide range of repair services. In contrast, Port of East London handles lower cargo volumes but frequent specialised vessel calls, aligning with labour-intensive, short-cycle maintenance and compliance-driven repairs. These results indicate that ship repair potential is shaped by vessel characteristics, operational frequency, and port infrastructure, rather than cargo throughput alone.

The study concludes that infrastructure gaps, skills shortages, and restrictive policies constrain the region's ship repair industry, leading to expenditure leakage to more established ports. Recommendations include port-specific infrastructure investment, regulatory reform, skills development initiatives, and public-private partnerships to unlock the sector's economic potential. By aligning repair development with port functions, the Eastern Cape can enhance regional economic growth and contribute more effectively to South Africa's blue economy objectives.

Keywords: Eastern Cape; economic impact; maritime development; port activity; Ship repair industry

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LIST OF ABBREVIATIONS AND ACRONYMS

CII	Carbon Intensity Indicator
DTI	Department of Trade and Industry (South Africa)
DPE	Department of Public Enterprises (South Africa)
EEXI	Energy Efficiency Existing Ship Index
EIA	Environmental Impact Assessment
IMO	International Maritime Organisation
IPAP	Industrial Policy Action Plan (South Africa)
MARPOL	International Convention for the Prevention of Pollution from Ships
PPP / PPPs	Public–Private Partnership(s)
Ro-Ro / RO-RO	Roll-on/Roll-off
SAMSA	South African Maritime Safety Authority
SIC	Standard Industry Classification
SOLAS	International Convention for the Safety of Life at Sea
StatsSA	Statistics South Africa
TNPA	Transnet National Ports Authority
UNCTAD	United Nations Conference on Trade and Development

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CHAPTER ONE

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

The maritime sector has historically been a vital driver of global economic growth, enabling trade, connectivity, and job creation (Struwig et al., 2023). Within this enormous sector, the ship repair industry is crucial for preserving the sustainability, operational effectiveness, and safety of maritime transportation (Ait Allal et al., 2022). Frequent maintenance and repair services minimise operational downtime, keep ships seaworthy, and support maritime businesses' profitability (Nasiri, 2024). Beyond some of the technical challenges beyond the scope of this study that may be encountered by the sector/industry, the ship repair industry contributes significantly to the economy by generating jobs and boosting related industries, including engineering, manufacturing, and logistics (Socoliuc, 2025).

The demand for specialised repair and maintenance services has expanded globally due to the growth of commercial fleets, technological advancements, and tighter environmental laws (UNCTAD, 2024). However, the ability to deliver these services is not equally dispersed throughout the world, especially in developing nations where infrastructure and investment limitations are still prevalent (Arif et al., 2025). Given the continent's rapidly expanding ports and marine trade, ship repair operations are increasingly recognised as a strategic opportunity from an African perspective (UNCTAD, 2024). However, the development of competitive repair centres is hampered by challenges that many African ports continue to face, including ageing infrastructure, limited dry-docking capacity, a lack of skilled labour, and inadequate technological capabilities (Erekosima & Bayo-Philip, 2022).

Standard Industry Codes (SIC) 38410 (building and repairing ships) and 38420 (building and repairing pleasure and sports boats) highlight the national significance of the industry in South Africa (Statistics South Africa, 2024). The government of South Africa introduced programs like Operation Phakisa in 2014, which established South Africa as a regional maritime hub (Loureiro, du Plessis, & Findlay, 2022). These scholars further assert that the government prioritised ship repair and other maritime services in recognition of the sector's potential. The South Africa maritime industry has a competitive edge in ship repair particularly in Sub-Saharan Africa, according to the Industrial Policy Action Plan (IPAP), however, this potential has largely gone unrealised (Kgaloshi & Nyika, 2023).

Within the South African national ship repair setting, the Eastern Cape is well positioned to play a stronger role in the ship repair value chain. The province hosts three important ports; East London, Ngqura and Port Elizabeth, all located along major international shipping routes that connect global maritime trade networks (Nelson Mandela University, 2025). This geographic positioning provides the region with a natural advantage for servicing vessels and participating more actively in maritime maintenance and repair activities.

A practical illustration of the region's existing ship repair capabilities occurred during the MSC Katrina incident in September 2021, when a large container ship suffered an engine-room fire in the Indian Ocean southwest of Port Elizabeth. According to Tugs & Towing News (2021), local repair teams successfully completed major afloat repairs despite the lack of suitable dry-docking facilities to handle the vessel. The incident illustrates both the operating capabilities and constraints of the region's repair industry.

In this context, strengthening the ship repair capacity in the Eastern Cape represents an important strategic opportunity. Expanding infrastructure and capabilities could enable the region to capture a larger share of ship repair activities along major global shipping routes, thereby enhancing South Africa's maritime competitiveness while supporting provincial industrial development and employment creation (Ayhan, 2023).

1.2 Background of the Study

The ship repair industry plays an important role in maritime commerce, fleet reliability, and overall competitiveness of ports. However, in many developing countries the growth of the industry is constrained by structural, operational, and resource related challenges (Arif et al., 2025). Container ports and marine service systems in lower-middle-income economies are often characterised by outdated infrastructure, limited marine craft availability, shortages of skilled personnel, and broader technical inefficiencies. These limitations restrict the expansion of value-added maritime activities such as ship repair and maintenance (Mthembu & Chasomeris, 2023).

Many of these structural and systemic challenges that affect emerging marine economies are also present in the Eastern Cape maritime sector. According to the Eastern Cape Socio-Economic Consultative Council (ESSECC, 2025), the province faces a shortage of specialised technical services within the ship repair industry. These include modern dry-docking facilities, advanced mechanical repair technologies, and certified marine engineering expertise. As a

result, the region's ship repair industry is limited in its ability to service a wider range of vessels and undertake more complex repair operations.

Research further indicates that contemporary ship repair markets are increasingly dependent on technologically advanced capabilities and specialised services to attract international clients (UNCTAD, 2024). Many emerging maritime hubs, however, struggle to meet these operational and technical requirements. Within South Africa's port system, severe skills shortages in fields such as welding, marine engineering, and port operations further exacerbate service restrictions (Mthembu & Chasomeris, 2023).

Despite these challenges, studies on port competitiveness reveal that geographic location, infrastructure capacity and transport linkages strongly influence a port's appeal to shipping lines (Mdanat et al., 2024). In this regard, the Eastern Cape's strategic coastal location provides favourable conditions for the development of a competitive ship repair hub. If infrastructure and skills gaps are addressed, the province could strengthen its position within the regional and global maritime repair market (Nelson Mandela University, 2025).

1.3 Problem Statement

South Africa is a proven location for resupply, repairs and maintenance for both regional and international shipping companies. However, the country accounts for less than 1% of the global ship repair market valued at approximately ZAR490 billion (Department of Forestry, Fisheries and the Environment, 2025). As a result, marine repairs undertake on only around 5% of the estimated 13 000 vessels that visit South African ports annually. The Department laments that National ship repair capacity has been steadily declining despite significant worldwide fleet expansion over the past ten years into the country's maritime space, leading to vessels being turned away due to the lack of dry dock and floating dock availability.

This national trend is reflected in the Eastern Cape, which, despite hosting three major ports East London, Ngqura, and Port Elizabeth remains underdeveloped in terms of ship repair capacity relative to other South African regions (Department of Forestry, Fisheries and the Environment, 2025). A major constraint affecting the development and competitiveness of ship repair services in South African ports, including those in the Eastern Cape, is the insufficient and ageing physical infrastructure required to support complex repair work (Mthembu & Chasomeris, 2023). According to these scholars, the provision of marine services across South

Africa's port system is constrained by outdated wet infrastructure, insufficient capacity of marine equipment, and an inadequate investment in both physical assets and human resources, which contribute to operational delays and limited-service capability.

In a similar vein, an analysis of South Africa's maritime economy highlights that the sector's performance, capacity and full economic potential remain strained by inefficient infrastructure and low investment in skilled labour and port facilities (Gumede & Mthembu, 2025). These infrastructural and skill-related inefficiencies, including limitations in berthing and ship repair facilities continue to represent a binding constraint on the expansion and competitiveness of the ship repair industry.

1.4 Rationale of the Study

Research on ship repair services in emerging and developing economies reveals that the industry frequently faces significant structural, operational, and resource-related challenges (Erekosima & Bayo-Philip, 2022). Similar studies for example, in Nigeria, have identified outdated equipment, a lack of modern technology, and a shortage of trained staff with contemporary technical skills as major constraints of the maritime industry development. These limits reflect South Africa, notably the Eastern Cape, where ageing facilities, insufficient dry-docking capacity and a shortage of specialised technical skills have hindered the province's ability to grab a higher share of ship repair demand (Mthembu & Chasomeris, 2023). The rationale for this study stems from the need to understand and address the constraints limiting the growth of the ship repair industry in the Eastern Cape and to identify pathways for unlocking its economic potential.

Although the Eastern Cape benefits from an advantageous geographic location, with ports such as East London, Ngqura and Port Elizabeth situated along important shipping routes, its participation in the ship repair value chain remains relatively low (Nelson Mandela University, 2025). Research indicates that capacity and service limitations, rather than geographic disadvantage, are the main causes of this underperformance in ports (Mdanat et al., 2024). Understanding the nature and economic implications of these constraints is vital for designing focused, regionally appropriate policies to boost infrastructure readiness, improve technical capability and strengthen the province's competitiveness within the national maritime system. This study seeks to make a scholarly contribution to maritime studies.

In addition, international trends indicate rising demand for technologically advanced and environmentally compliant ship repair services, driven by fleet expansion and stricter regulatory requirements (UNCTAD, 2024). Within South Africa, national maritime policy initiatives such as Operation Phakisa specifically highlight the need to increase the capacity for marine manufacturing, maintenance, and repair (Smit, 2024). Strengthening ship repair capabilities in the Eastern Cape is therefore not only regionally significant but also connected with broader national economic and policy interests. The study's findings relating to the opportunities, challenges, and possible development paths for the Eastern Cape ship repair business outline the significance of contemporary understanding of the ship repair industry in the Eastern Cape, its economic impact and future development for the country.

1.5 Research Aims and Objectives

The aim of this study is to examine the factors limiting the growth of the ship repair industry in the Eastern Cape. The study further seeks to evaluate the region's potential to attract shipping companies for repair services and to assess market opportunities for future sector development and investment.

Research Objectives:

1. To identify the challenges preventing industry growth

This objective examines the factors contributing to the underdevelopment of the ship repair industry in the Eastern Cape, including gaps in infrastructure, services, and investment across the three major ports: Port Elizabeth, East London, and Ngqura.

2. To assess the region's attractiveness for shipping companies

This objective will explore the strategic advantages and potential benefits that could attract shipping companies to choose the Eastern Cape for repairs, focusing on geographical positioning, service offerings, and cost-effectiveness

3. To evaluate market potential and investment opportunities

This objective investigates the types of vessels and cargo currently calling at Eastern Cape ports and assesses the potential demand for ship repair services. It also explores

strategies that could encourage private sector investment in the region's ship repair facilities.

1.6 Research Questions

The three principal research questions posed in this study are:

1. Why has the ship repair industry in the Eastern Cape not reached its full potential?
2. How can the region attract shipping companies for repair services?
3. Is there a viable market for ship repairs in the region that could support sector investment?

1.7 Research Methodology

This study employed a quantitative research approach, using a desktop research method with secondary data to analyse the ship repair industry's economic impact and future development in the Eastern Cape. The study further examined industry challenges, the region's attractiveness to shipping companies, and market opportunities. The research design, data collection methods, and analytical approaches are also outlined to ensure the reliability and validity of the findings.

1.8 Structure of the Dissertation

This dissertation is structured as follows:

Chapter 1 Introduction and Background: This chapter introduces the study, starting with an overview of the ship repair business from a global context to the African and South African contexts, particularly the Eastern Cape. The significance of the ship repair sector is described, emphasising its opportunities, challenges, and financial potential. The chapter also outlines the study's goals and objectives, highlighting the area's advantageous location for maritime development.

Chapter 2: Literature Review: In this chapter, the body of knowledge regarding current research and the literature pertaining to the ship repair sector is examined. The chapter begins with a global perspective, examining trends, economic effects, and technological advancements, before shifting the focus to the African and South African contexts. The Eastern Cape is the main subject of review for this chapter. The chapter draws on existing literature to highlight the region's unique problems, including inadequate infrastructure, low investment,

and a lack of modern maintenance facilities. Opportunities such as utilisation of geographical advantages, cost efficiency, and Special Economic Zones (SEZs) emerge from the existing literature. The chapter's findings from the existing literature provide valuable insights into the Eastern Cape's potential as a competitive regional repair hub.

Chapter 3: Research Methodology: This chapter describes the study's research approach. This quantitative research technique covers the research design, research methodology, data collection, data analysis, and ethical clearance.

Chapter 4: Analysis and Discussion: The results from the data analysis are presented in this chapter, arranged according to major themes such as cargo handling and vessel arrivals. This chapter connects these trends to the literature review in Chapter 2 and explores the implications for the Eastern Cape ship repair industry. The chapter highlights the potential for increasing specialised maintenance services, improving infrastructure, and aligning with global maritime trends, such as environmental sustainability and technological innovation.

Chapter 5: Conclusion and Recommendations: This chapter synthesises the findings of the study, drawing conclusions on the economic impact and prospects of the ship repair industry in the Eastern Cape. The chapter provides actionable recommendations for addressing infrastructure gaps, fostering skill development, and implementing policy reforms. Additionally, the chapter looks at ways to increase the region's competitiveness by utilizing government incentives, Public-Private Partnerships (PPPs), and new international trends. It concludes by underlining the necessity for coordinated efforts to convert the Eastern Cape into a dynamic and sustainable ship repair hub.

1.9 Conclusion

An overview of the ship repair sector was presented in Chapter 1, starting from a worldwide perspective, then focusing on the African, South African and Eastern Cape setting. The chapter emphasised the importance of the ship repair sector, highlighting the economic potential, main problems, and prospects for expansion.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Introduction

The ship repair industry is an essential element of the maritime sector, facilitating worldwide trade by ensuring operational efficiency, safety, and longevity of vessels (Zhu et al., 2023). The expansion of the shipping industry is driving increasing demand for reliable, cost-effective repair services, thereby impacting market trends, investment behaviours, and regional competitiveness (Chaidos, 2024).

This chapter examines the global, continental and South African context of the ship repair industry, highlighting key challenges and opportunities for growth. The review begins with an overview of the ship repair industry, outlining its fundamental role and economic significance. It subsequently analyses global, African, and South African market trends, highlighting variations in regional approaches to ship repair services. The chapter also identifies critical factors impeding the industry's growth.

Given the Eastern Cape's strategic location with three commercial ports, Port of East London, Port of Ngqura, and Port of Port Elizabeth (Nelson Mandela University, 2025); the study further assesses the region's attractiveness for ship repair services. Metrics like vessel arrivals and cargo handling provide insight into market potential and investment prospects. The review concludes by examining measures to improve the region's status as a competitive ship repair centre, utilising geographic benefits, cost efficiencies, and policy structures.

The rationale behind this literature review is to contextualise these challenges and establish a framework for understanding the existing situation and developmental possibilities of the ship repair industry in the Eastern Cape.

2.2 Overview of the Ship Repair Industry

The ship repair industry is crucial for maintaining global marine activities, as vessels require routine maintenance to comply with international safety, environmental regulations, improve operational performance, reliability, and prolong their operational lifespans (Zeng et al., 2025). The sector offers a range of services that require specialised facilities and expertise, such as

routine maintenance, emergency repairs, and vessel conversions (Kalafatelis et al., 2025). These scholars further assert that modern maintenance frameworks include routine servicing and corrective interventions that can be carried out alongside berths or while a vessel is afloat. Such maintenance and repair operations are typically undertaken when the required work is limited in scope or when rapid execution is necessary, although shipyards remain the primary locations for most ship repair activities.

Kim & Lee (2022) argue that competitiveness of ship repair services is shaped by elements such as geographic location, repair costs, infrastructure capacity and service efficiency and that this defines the economic feasibility of ship repair operations Kim et al, (2022) reiterate that ports located along major shipping routes profit from the high volume of vessels, whereas nations with cheaper labour costs tend to attract more repair contracts In addition, the demand for ship repair and maintenance service is intimately tied to global trade patterns and vessel activity. More ships operate as seaborne commerce as volumes rise, necessitating regular maintenance, dry-docking, and regulatory inspections to guarantee operational effectiveness and safety (UNCTAD, 2025).

Meanwhile, Verschuur, Koks, and Hall (2022) state that there is a strong correlation between the volumes of international trade handled by maritime transportation and increases in port calls, cargo throughput, and port performance. They argue that increased throughput and vessel movements boost the utilisation of maritime assets and related services. According to their analysis, ship operating patterns and the need for auxiliary services are impacted by port calls and cargo handling, which typically decline during contractions in global trade and rise during expansions (UNCTAD, 2025). These dynamics show how the ship repair sector is linked to international shipping patterns and commerce flows.

Aspects of the overall study evaluate the influence of the maritime industry dynamics on the Eastern Cape's viability as a ship repair hub, by analysing global and regional market trends, investment patterns and infrastructure capabilities. This helps towards the crafting of strategies for enhancing the industry's role within South Africa's maritime economy

2.2.1 The Global Market and Trends

Increasing vessel sizes, technology improvements, and changing regulatory frameworks have all had a significant impact on the ship repair sector (Notteboom & Rodrigue, 2023). Thus, according to the International Maritime Organization (IMO, 2023), ship repair centres are adjusting to new demands as global trade grows and environmental concerns transform the marine industry. However, according to Pires et al., (2023) the predominance of certain regions over others in the global market prompts questions regarding emerging markets, such as the Eastern Cape to emerge as a competitive player in the sector.

A significant trend influencing the global ship repair industry is the shift towards environmentally sustainable alternatives (Wang & Notteboom, 2022). The IMO has implemented rigorous regulations targeted at decreasing carbon emissions, such as the IMO 2023 carbon intensity indicator (CII) and the Energy Efficiency Existing Ship Index (EEXI) (IMO, 2023). Wang & Notteboom (2022) emphasise that shipowners have been forced by these regulations to switch to ships with alternative fuel systems, energy-efficient engines, and ballast water treatment technology.

Consequently, ship repair facilities that can perform emissions-compliant modifications and green retrofits have gained a competitive advantage in the global market (Zhang et al., 2021). At the same time, these global developments are occurring alongside increasing digitisation within ship repair operations (Sanchez et al., 2022). The deployment of predictive maintenance technologies, aided by big data analytics and the Internet of Things (IoT), is reducing vessel downtime and improving operating efficiency (Sanchez et al., 2022). Notteboom & Pallis (2023) argue that automated diagnostics and robotics have been integrated into repair processes in modern shipyards, such those in Rotterdam and Singapore, enabling greater repair precision and faster turnaround times. These technological developments in the maritime sector highlight the need for ship repair centres, particularly those in South Africa, to adopt innovative practices or risk marginalisation in the global market (Kim et al., 2022).

Lee and Cullinane, (2023) assert that the expansion of global shipping fleets has prompted the need for shipyards to improve their infrastructure especially with the introduction of LNG-powered ships and ultra-large container vessels (ULCVs) Kim et al., (2022) concur that many of the world's main ship repair centres such as Dubai, Singapore, and China have invested extensively in deep-draft dry docks, large-scale crane systems, and LNG-compliant repair infrastructure to accommodate these contemporary vessels. However, Notteboom and Pallis

(2023), note that developing regions frequently lack basic infrastructure, which makes it difficult for some repair hubs to compete for lucrative repair contracts in the global market.

Notteboom and Rodrigue (2023) posit that the distribution of global ship repair markets highlights inequalities in competitiveness. For example, they argue that Asia, Europe, and the Middle East collectively dominate the industry, due to well-established shipyards, economical labour, and strategic locations along key maritime trade routes. Thus, (Lee & Wang, 2023) reiterate that China, South Korea, and Singapore lead in Asia, leveraging economies of scale and government funded investments, while Europe has strong companies like the Netherlands and Germany that focus on high-quality, technologically advanced services. By offering complete ship repair services along crucial trade corridors, the Middle East, the United Arab Emirates, and Turkey in particular take advantage of their geographic advantage (Kumar et al., 2023).

However, notwithstanding their global supremacy, these regions face challenges such as rising labour costs, geopolitical strife, and variable fuel prices, which affect a shipowners' repair decisions (Rodrigue, 2023). Pires et al., (2023) elaborate that the growing demand for decarbonisation, for example, has led to increased demand for green retrofits, resulting in shipyards without the appropriate skills or facilities for these upgrades to be confronted by challenges in sustaining competitiveness. These scholars assert that through benchmarking global sustainability trends and providing specialised services that meet the needs of contemporary fleets, emerging countries have the chance to establish a global niche.

Wang and Cullinane (2022) assert that the competitiveness of any region in ship maintenance is still largely determined by its strategic position. They maintain that leading repair hubs, such as Singapore along the Strait of Malacca and Dubai near the Persian Gulf, efficiently use the proximity to key shipping lanes to attract continuous repair work. This suggests that the Eastern Cape region with its three key ports has potential for the growth of a competitive ship repair market. Smith et al., (2023) stress that harnessing such potential would demand major investment in infrastructure, skills development, and regulatory reforms to boost service efficiency and global competitiveness.

2.2.2 The African Market and Trends

The African market has equally become an important player in ship repair industry. For example, Wang & Notteboom (2022) hold that economic significance of the ship repair

industry is progressively recognised throughout Africa, as countries endeavour to leverage maritime resources to promote industrialisation, employment generation and economic diversification. Kambase (2020) maintains that Africa has always lagged behind other regions in terms of ship repair facilities and capacity, despite the continent's vast coastline and important maritime routes. However, numerous governments in Africa have begun investing in this industry, to minimise dependence on foreign shipyards, enhance revenue retention and develop domestic maritime capabilities (African Development Bank, 2019). Smith et al., (2023) remind us that the varying degrees of success in these programs demonstrate the prospects and difficulties associated with developing a competitive ship repair industry in Africa.

One of the primary drivers behind Africa's focus on ship repair is the economic burden of outsourcing maintenance and repairs to foreign shipyards. As such Kambase (2020), laments that due to logistical limitations, many African shipowners have traditionally relied on facilities in Europe, the Middle East, and Asia, which has resulted in expensive costs and lengthy turnaround times. These are some of the realities that shape the trends in the African ship repair market. Thus, to capitalise on the growing need for repair services and create a regional maritime hub, nations like Ghana, Nigeria, and Kenya are building up their domestic repair capabilities (African Development Bank, 2019). Smith et al., (2023) advises that the ability of these nations to compete in the global market is dependent upon infrastructural expenditures, regulatory frameworks and industrial knowledge.

Ghana has significantly advanced in strengthening the region's ship repair sector, acknowledging the ship repair sector as an essential component of the broader maritime economy. The Ghanaian Government has instituted governance and operational reforms to enhance efficiency in the shipyard management, leading to increased investment in repair services (Kambase, 2020). These measures have contributed to employment creation and skill development, while establishing Ghana as a viable repair destination, for both domestic and foreign vessels (African Development Bank, 2019). The ship repair sector is generally a complex and challenging of the maritime industry. Accordingly, Smith et al, (2023) lament that challenges such as inconsistent policy execution and the need for significant infrastructure enhancements remain formidable obstacles to fully fulfilling the ship repair sector's potential.

Nigeria, the largest economy in Africa has prioritised the advancement of the ship repair industry as part of a strategy to attain maritime self-sufficiency. Ologe (2023) outlines that

Nigeria has developed regulations to promote domestic ship repairs and decrease the financial cost connected with overseas maintenance services. The scholar further asserts that Nigeria aims to develop its own shipyards to create a robust repair industry that serves the offshore oil and shipping sectors. They also posit that the efficacy of these programmes' rests on continuous investment, regulatory consistency, and workforce development.

The case of Kenya further emphasises the importance of investment in the ship repair sector (African Development Bank, 2019). With the support of external partners such as the African Development Bank (AfDB), Kenya invested in modernising its ship repair facilities. This investment has enabled the country to attract additional vessels for maintenance and repair, thereby strengthening its competitiveness in the East African maritime sector. By leveraging Mombasa Port's strategic location as the largest and busiest port in East Africa, Kenya has been able to capitalise on regional shipping traffic to expand its ship repair market (African Development Bank, 2019).

The increasing emphasis on ship repair in many African countries illustrates the industry's capacity as an economic catalyst with the potential to stimulate broader maritime growth. This is acknowledged by Smith et al. (2023) who argue that while these investments have had a positive impact, yielding great results, African countries continue to encounter formidable competition from established global players. These scholars also note that for South Africa, and particularly the Eastern Cape, these examples provide significant insights into the necessity of infrastructure investment, policy coherence, and international collaboration. According to (African Development Bank, 2019), as South Africa seeks to grow the ship repair sector, lessons from Ghana, Nigeria, and Kenya highlight the prospects and structural modifications required to establish as a favourable hub for ship repairs in the Southern Hemisphere.

2.2.3 The South African Markets and Trends

The South African ship repair sector context is closely similar to that of the broader African continent. Smith et al. (2023) reiterate that the ship repair industry forms an integral component of South Africa's broader maritime economy, supporting both domestic and international vessel operations. As such, South Africa's extensive coastline and strategic position at the confluence of the Atlantic and Indian Oceans place it along one of the world's busiest shipping corridors, offering inherent potential to capture greater ship repair demand (Wang & Notteboom, 2022).

However, despite these geographic advantages, empirical research on the maritime economy nexus reveals that the sector's contribution to national economic growth has been limited by ongoing infrastructural inefficiencies, low investment and private sector participation, and issues with policy and governance that prevent its full development (Gumede & Mthembu, 2025). Mthembu and Chasomeris (2023) hold a view that South African ports continue to operate within a primarily state-controlled governance environment in which infrastructure investment has fallen behind global benchmarks, and marine service capacity, notably those essential to ship repair remain under-developed.

2.2.3.1 Ship Repair Facilities

The South African ship repair market is primarily characterised by the dominance of state-owned repair facilities operated by Transnet National Ports Authority (TNPA), as illustrated in Table 1. These facilities, situated in ports such as Cape Town, Durban, East London, and Port Elizabeth, provide essential graving docks, floating docks, and repair quays. However, the efficiency and capacity have been consistently investigated, with concerns over aged infrastructure, long turnaround times, and bureaucratic bottlenecks hindering ideal performance (TNPA, 2022). Notably, the absence of specialised repair facilities at ports like Richards Bay and Ngqura limits the industry's potential to obtain business in these locations.

In contrast, the private sector repair facilities enumerated in Table 2 demonstrate a growing yet still constrained role in the industry. Findings from the review highlight that competitive floating dock services have been developed by businesses like Dormac, Eldock, and South African Shipyards, which are mostly situated in Durban, to supplement the services provided by the public sector. The private sector's participation has boosted efficiency and service quality; however, the industry is hampered by insufficient large-scale investment and policy support necessary for further expansion (SAMSA, 2021). The scarcity of private repair facilities beyond Durban implies an excessive dependence on TNPA controlled ports, raising worries regarding the industry's ability to develop and satisfy expanding demand.

Table 1: Public sector (Transnet) repair facilities

Port	Facility	Type
Cape Town	Sturrock Dock	Graving dock
	Robinson Dock	Graving dock
	Syncrolift	Syncrolift with 5 repair bays
	“A” berth	Repairs afloat
	Repair Quay	Repairs afloat
Saldanha Bay	Mossgas yard	Fabrication yard
	Berth 204	Multi-purpose berth also used for repairs
Durban	Prince Edward	Graving dock
	Floating dock no.3	Floating dock
	Workshop 24	Machine shop
	Repair Quays	
East London	Dry dock	Graving dock
	Workshop 17	Machine shop
	Repair quay	Repairs afloat
Richards Bay	No existing facilities	
Port Elizabeth	Main slipway	Slipway
	Old slipway	Slipway
	Workshop 17	Machine shop
Ngqura	No existing facilities	
Mossel Bay	Slipway	Slipway

Source: TNPA

Table 2: Private sector repair facilities

Port	Facility	Type
Durban	Eldock	Floating dock
	Dormac	Floating dock
	South African Shipyards	Floating dock

Source: DTI/DPE/TNPA

2.2.3.2 Ships Undergoing Repairs in South Africa

Ship repair activity is not evenly distributed throughout South Africa; certain ports see noticeably more repair activity than others (TNPA, 2022). This uneven distribution reflects variations in port attractiveness and service capacity, which are shaped by factors such as infrastructure quality, investment levels, and strategic geographic location. These factors influence port connectivity and, ultimately, shipping lines' and port users' decisions regarding where to call for vessel maintenance and repair. (Munim et al., 2022).

By analysing the number of ships entering South African ports primarily for repairs, it becomes possible to examine regional discrepancies and discover prospects for expansion, particularly in the underutilised ports of the Eastern Cape.

Table 3: Number of ships entering South African ports primarily for repair, 2008 - 2012

CY	2008	2009	2010	2011	2012
Cape Town	79	72	80	99	128
Saldanha	6	13	11	19	5
Durban	105	84	108	120	117
East London	12	7	8	7	5
Richards Bay	14	43	46	54	11
Port Elizabeth	1	5	1	6	5
Ngqura	0	1	4	1	16

Note: (a) figures are not available for Mossel Bay

Source: TNPA

The data presented in Table 3 illustrates the trends in ship repair activity across major South African ports from 2008 to 2012, based on vessels entering ports primarily for repair purposes. The national ship repair sector is evidently dominated by Durban and Cape Town, which continuously attract the greatest number of vessels coming in for maintenance. While Durban maintains high numbers, reaching a peak of 120 ships in 2011, Cape Town sees steady growth, rising from 79 ships in 2008 to 128 in 2012. This pattern implies that these ports are preferable locations for ships in need of maintenance because they have more developed infrastructure, trained labour, and a strong reputation for ship repair services.

In contrast, the Eastern Cape's ports, Port of East London, Port of Port Elizabeth and Port of Ngqura record significantly lower figures, reflecting limited ship repair activity. East London

indicates a reduction throughout the years, with ship repair calls declining from 12 in 2008 to just 5 in 2012. This decline raises the possibility that the port lacks the funding or facilities required to compete with other significant repair hubs. Similarly, Port Elizabeth demonstrates modest activity, receiving no more than six ships in any given year, demonstrating that ship maintenance is not a substantial element of its marine operations. On the other hand, Ngqura, a relatively new port, exhibits a rising trend, going from zero repair calls in 2008 to sixteen in 2012. This implies that ship repair firms may find newer ports with more up-to-date infrastructure more appealing, offering possible expansion opportunities.

The low numbers recorded for the Eastern Cape ports highlight a missed economic opportunity, given the province's strategic positioning along vital maritime corridors. The low repair activity may stem from insufficient investment in dry docks, repair facilities, and skilled labour, making it difficult for these to compete with the more established counterparts (Mthembu & Chasomeris, 2023). If properly developed, the Eastern Cape's ports might provide a viable option to Cape Town and Durban, especially as global shipping trends drive for cost-efficient and geographically favourable repair locations. The growing numbers at Ngqura support the sector's growth potential by showing that infrastructure investment can have a favourable impact.

It is crucial to note that disaggregated statistics on vessels visiting South African ports specifically for ship repair reasons are only publicly available for the period 2008 to 2012, as provided through Transnet National Ports Authority. From 2013 forward, ship-repair-specific entry data are no longer given separately in publicly accessible port statistics, with reporting instead focusing on aggregate vessel calls, cargo throughput and broader port performance metrics. Because of this, Table 3 is purposefully restricted to the years 2008–2012. To analyse more current developments in maritime activity and their implications for ship repair demand, Chapter 4 examines broader variables, such as vessel arrivals, cargo handling volumes, and port utilisation metrics.

The broader trends reflected in the table suggest that South Africa's ship repair business is predominantly concentrated in a few key locations, which may present challenges for regional economic balance. However, this also provides an opportunity for underutilised ports such as those in the Eastern Cape, to expand capabilities and attract a larger share of the ship repair market. By capitalising on the strategic position and addressing infrastructure and investment

gaps, the three ports could strengthen the Eastern Cape's role in the maritime industry, establishing as a competitive ship repair centre.

2.2.4 The Eastern Cape Market and Trends

The Eastern Cape region of South Africa hosts three commercial ports, the Port of Port Elizabeth, the Port of East London, and the Port of Ngqura which collectively contribute to the province's engagement in the national maritime economy. These ports are part of South Africa's greater port network, which enables international trade and acts as gateways for both regional and global supply chains (Mthembu & Chasomeris, 2023). For Matekenya (2025), despite the strategic relevance of these facilities, research reveals continuous underperformance in port efficiency, infrastructure adequacy, and service capacity when compared with major South African ports such as Cape Town and Durban. This scholar asserts that evaluations of port technical efficiency demonstrate that Eastern Cape ports fail to operate at optimal scale, indicating issues in resources, infrastructure, and operational capabilities that hinder their competitiveness.

2.2.4.1 Port of Port Elizabeth

According to Burger (2018), the Port of Port Elizabeth is a versatile port that can handle bulk liquid, general cargo, and container ships. This port is sustained by Wang & Notteboom (2022) who argue the port's involvement in the industrial and automotive export industries gives a potential for the establishment of as a specialised ship repair hub. However, a lack of sophisticated dry-docking facilities and inadequate infrastructure hinder the port's ability to draw larger vessels that need intricate repairs (Notteboom & Rodrigue, 2023). This is a significant downside given the increased requirement for mid-life retrofits, sustainability-driven upgrades, and routine maintenance in the maritime sector.

Currently, the port runs two slipways, mostly for the recreational boating and fishing businesses. Up to three small vessels can dock simultaneously on the main slipway's 1,200-ton lifting capacity, while a smaller, updated slipway can now hold up to 90 tons, an increase from its initial 40-ton capacity (Burger, 2018). Although these slipways serve the local fishing industry, they are inadequate for attracting high-value ship repair projects, restricting the port's capacity to compete with Durban or Cape Town in servicing larger boats (Kim et al., 2022).

Additionally, the Transnet National Ports Authority (TNPA) oversees Workshop 17, which is mostly used for the upkeep and repair of harbour vessels, small port craft, and maritime equipment related to regular port operations (Burger, 2018). Lee and Wang (2023) further argue that the port's repair potential is underutilised, underlining the need for strategic investment in infrastructure to boost its competitiveness. As such Rodrigue (2023) laments that without considerable changes, the Port of Port Elizabeth risks being a secondary participant in South Africa's ship repair industry rather than growing as a preferred location for ship maintenance.

2.2.4.2 Port of East London

Pires et al. (2023) posit that the Port of East London is South Africa's only commercial river port and primarily handles general cargo and liquid bulk traffic, including petroleum and tanker-related cargoes, reflecting its specialised but limited role within the national port system. They also argue that although the port has experienced steady growth in cargo volumes and vessel arrivals, it has enjoyed consistent expansion in cargo quantities and vessel arrivals, the port's ship repair skills remain rudimentary, preventing it from capitalising on the growing demand for marine maintenance services. The insufficient infrastructure and obsolete repair equipment weaken the port's potential to attract large-scale ship repair contracts, generating worries about long-term viability in an increasingly competitive market (Kumar et al., 2023).

Smith et al. (2023) point out that the East London's ship repair facilities include a repair quay, workshop, and a 200-meter-long graving dock, much smaller than comparable dry-dock equipment in Durban and Cape Town. According to these scholars, although the graving dock remains operational, there is a challenge of ageing cranes, obsolete support equipment, and limited lifting capacity which negatively impact the port's ability to meet contemporary ship repair requirements. For example, Burger (2018) confirms that Workshop 17, once designed for upgrading naval equipment, was currently underutilised due to antiquated gear and intermittent demand.

2.2.4.3 Port of Ngqura

Lee and Cullinane (2023) clarify that the Port of Ngqura is South Africa's newest deep-water port, designed primarily for container handling. According to Wang and Notteboom (2022),

the Port of Ngqura is located along major international shipping routes, and it positions as a potential maritime hub, however, lacks the equipment required to become a ship repair facility. This challenge is echoed by Rodrigue (2023) who laments that the port's ability to service the ships it receives is severely limited. This is due to its lack of a dedicated ship repair facility, in contrast to other large ports. Shipowners are therefore, according to Pires et al. (2023), forced to rely on other ports for maintenance due to the lack of dry docks or floating docks at the Port of Ngqura, which reduces its ability to make money from repair services.

The ship repair activities are currently very limited at the Port Nqqura. This is confirmed by Smith et al. (2023), who insist that the current repair work at Ngqura is conducted on an ad hoc basis at the manganese berth quay, a temporary and inefficient solution Without a structured ship repair strategy, the port remains underutilised in this segment of the maritime economy (Kumar et al., 2023). Given the port's modern infrastructure and strategic location, Ngqura has the potential to attract investment in ship repair facilities (Lee & Cullinane, 2023). Pires et al. (2023) hold a view that for the port to fully realise the potential to attract investment nationally, maritime policy must change to prioritise the development of repair capabilities to support the port's current container operations.

2.3 Factors Hindering the Growth of the Ship Repair Industry in the Eastern Cape

There are a few factors at play which hinder the growth of ship repair industry in the Eastern Cape region. Wang and Notteboom (2022) provide insights that due to its proximity to important maritime trade corridors, the Eastern Cape's strategic location along important international shipping routes indicates strong potential for the development of a competitive ship repair industry. However, according to Havenga and Simpson (2020), persistent underfunding has caused Eastern Cape ports to fall behind other South African hubs, making it more difficult for them to upgrade infrastructure and increase repair capacity.

Strategic investment is required if the repair infrastructure is to be upgraded to optimal standards. Ngcobo and Jones (2021) concur that strategic development is hampered while investment is discouraged by policy and regulatory complications, such as mismatched governance structures and restrictive frameworks for private sector participation. A closer analysis of suggests that these obstacles collectively impede the Eastern Cape's potential to create a sustainable and competitive ship repair industry. Infrastructural gaps are the key factors

at play which impact on the growth of the ship repair industry in the Eastern Cape and the section below cites some the challenges.

2.3.1 Infrastructure Gaps

Infrastructural capacity and skilled human capital are critical in the ship repair industry. For example, Mdanat et al. (2024) concur that the availability of contemporary dry-docking facilities, effective port services, and well-maintained equipment directly affects a region's capacity to draw in and keep ship repair contracts. They make a case that such processes and systems could make infrastructure the cornerstone of a competitive ship repair business. It is important to note that congestion and inefficiency result from inadequate infrastructure, which discourages potential users and lowers the port's profitability.

Ameur et al. (2024) argue that port operational performance and competitiveness are directly linked to the calibre and capability of physical infrastructure, cargo handling machinery, and logistics integration. Any deficits in these areas according to these scholars are linked to delays, longer turnaround times, and reduced service reliability. The ramifications of these inefficiencies are significant in the ship repair sector. Mthembu & Chasomeris (2023) concur that an inadequate number of port vessels in addition to aged equipment further compound operational inefficiencies. Such infrastructural gaps are harmful in the ship repair sector, where productivity and turnaround times are crucial success factors.

The South African ports have generally underperformed in global rankings, highlighting the extent of the crisis (World Bank, 2021). The Port of Port Elizabeth was ranked at 312, the Port of Ngqura at 363, and the Cape Town Port at 365 in the World Bank's 2021 assessment of 370 container-handling facilities (World Bank, 2021). These rankings cast doubt on the nation's capacity to compete with international repair centres like Rotterdam and Singapore, who have made significant investments in infrastructure improvements. Mthembu and Chasomeris (2023) estimate that underperformance at South African ports can diminish shipping-related revenues by up to 5%, highlighting the financial burden of neglected infrastructure.

The Port of Port Elizabeth, despite its strategic location, is hampered by inadequate dry-docking capacity and an overreliance on slipways primarily intended for fishing vessels (TNPA, 2021). Havenga and Simpson (2020) bemoan the fact that vessel operators are forced to look for maintenance services elsewhere because their slipways are insufficient to handle large commercial ships. Similarly, East London's graving dock, albeit functioning, is

substantially smaller than equivalent facilities in Cape Town and Durban. This hampers the port's ability to accommodate high-volume or sophisticated repairs (Ports Regulator of South Africa, 2022). The dock's antiquated cranes make matters worse by decreasing operational effectiveness and lengthening turnaround times (Ngcobo & Mlambo, 2019).

Port Ngqura is a notable case of a contemporary deep-water port because it is marked by high transshipment activity, but it has no specific ship repair infrastructure (Transnet, 2023). Jones (2021) suggests that shipowners stopping at Port of Ngqura must employ interim alternatives, such as the manganese berth quay, which is not meant to accommodate large-scale repair work. Meanwhile, the World Bank (2020) predicts that Ngqura's location along important international shipping routes could make it a natural hub for ship maintenance; however, the lack of infrastructural investment in repair capacity is a lost opportunity.

The failure to address these infrastructure issues has broader economic implications. In an era of rapidly expanding maritime economies, infrastructure gaps are no longer merely operational inefficiencies; they represent existential challenges to the long-term survival of a country's ship repair business (UNCTAD, 2022).

2.3.2 Limited Investment

The disparity in investment among South Africa's major ports further exacerbates the Eastern Cape's challenges. While Cape Town and Durban have benefitted from sustained investment in ship repair, the Eastern Cape has struggled to obtain comparable financial support (Ports Regulator of South Africa, 2022). The absence of a clear and targeted investment strategy has left the province's ports underutilised, and this compels transit vessels to bypass local repair facilities in favour of adequately equipped alternatives in Durban and Cape Town (TNPA, 2023). The long-term viability of the Eastern Cape's maritime industry is threatened by this persistent underinvestment, which also constitutes a lost economic opportunity (SAMSA, 2021).

The Eastern Cape's ports remain underdeveloped, lacking the scale and modernisation needed to compete effectively (Ngcobo & Mlambo, 2019). This disparity highlights the urgent need for a cohesive investment strategy tailored to the region's ship repair potential. Such a strategy should encompass private sector incentives, state-backed funding, and infrastructure partnerships to drive sustainable growth (World Bank, 2020). As Sahoo et al. (2024) emphasises, the absence of enough investment capital restricts ports from operating at full

capacity, restricting the port's ability to perform important services like ship maintenance. As a result, employment prospects decline, regional competitiveness declines, and technological innovation is stagnated. These difficulties are reflected in the Eastern Cape, where shipyards and repair facilities are ill-equipped to handle the increasing demand for maintenance services due to the ports' failure to draw in enough funding (Havenga & Simpson, 2020).

A strategic approach to investment in ship repair is essential to maintaining competitiveness in the evolving global maritime environment. As international regulatory frameworks tighten and vessel technology advances, repair facilities must modernise to meet the standards of new repair demands. As such, technological innovation and increasingly stringent regulation are reshaping port operations and requiring infrastructure and service upgrades to maintain efficiency and competitiveness (Mdanat et al., 2024).

Notteboom and Pallis (2023) raise an important factor that one of the primary barriers to investment in the Eastern Cape's ship repair industry is the lack of incentives for private sector involvement. Meanwhile, Globally, Public-Private Partnerships (PPPs) have proven effective in revitalising ship repair infrastructure, as seen in leading repair hubs such as Singapore and Rotterdam (World Bank, 2020). Notteboom and Pallis (2023) relate that globally acclaimed repair hubs have effectively utilised private sector expertise and funding to develop state-of-the-art repair facilities, ensuring long-term sustainability and global competitiveness.

On the contrary to global practices, the Eastern Cape has been slow in adopting and implementing comparable investment strategies. The region has instead depended on state-owned infrastructure that struggles to meet industry demands. This overreliance on state-owned infrastructure exacerbates regional competitiveness challenges and reflecting broader shortfalls in port infrastructure investment and performance relative to better supported South African ports (Joynt, 2024). Promoting Public-Private Partnerships in the province could stimulate much-needed investment, enabling private ship repair companies to modernise existing facilities while reducing the financial burden on the government. With such interventions, the Eastern Cape's ship repair industry risks stagnation, missing out on opportunities for growth in a sector that is vital to the regional and national economy.

2.3.3 Policy and Regulatory Issues

Policy and regulatory frameworks are crucial in determining the efficiency and competitiveness of the ship repair industry (Notteboom & Pallis, 2023). Operational policies and procedures directly impact the speed and quality of services rendered to vessels, however, inefficiencies within these frameworks often lead to delays, increased costs, and reduced investor confidence, creating a challenging landscape for the industry (Munim & Schramm, 2020).

A further challenge lies in the port regulatory environment, which contributes to the under-recovery of operating costs. This lack of funds restricts investments in infrastructural improvements, human resources, and necessary marine equipment (Mthembu & Chasomeris, 2023). Without appropriate finance, Eastern Cape ports remain unable to update or expand ship repair facilities to satisfy current and future demand, limiting their capacity to compete with more established national and international repair hubs (Button, 2022).

Policy misalignment at national and regional levels further inhibits the development of the Eastern Cape's ship repair industry. Ngcobo & Jones (2021) note that land use, procurement, and environmental compliance regulations often fail to meet the specific requirements of regional ports. These regulatory challenges represent additional factors influencing the operational efficiency and competitiveness of such ports. For example, the Transnet National Ports Authority's (TNPA) conservative policies restrict the amount of money that private companies can invest in and run ship repair facilities. Moyo (2019) asserts that such policies tend to discourage private sector participation and leads to lost opportunities for modernisation and innovation. Global ship repair hubs like Singapore and Rotterdam, on the other hand, have adopted legislative structures that encourage private sector investment, which promote ongoing technical innovation and infrastructural enhancement (Notteboom & Pallis, 2023).

Furthermore, the regulatory framework governing ship repair is characterised by prolonged and cumbersome approval processes (Notteboom & Pallis, 2023). According to Chen (2020), environmental impact assessments, procurement protocols, and labour compliance requirements, though essential, often introduce significant delays for companies seeking to enter or expand within the market. These inefficiencies, as Van Niekerk (2021) relates, increase operational costs and deter both local and international investors from committing to long-term projects in the Eastern Cape.

These difficult policy regulations are made worse by the lack of a unified and efficient policy strategy. The ship repair sector confronts significant uncertainty in the absence of well-defined plans for infrastructure development and private sector involvement (Mthembu & Chasomeris, 2023). Notteboom & Pallis, (2023) insist that long-term planning is hampered by this uncertainty, and the area's capacity to compete with other ship repair hubs is diminished.

In conclusion, policy and regulatory difficulties pose a key impediment to the growth of the Eastern Cape's ship repair industry. A coordinated strategy that prioritises regulatory efficiency, harmonises national and regional policies, and which encourages private-sector investment is needed to address these issues (Ngcobo & Jones, 2021). The Eastern Cape can improve its competitiveness and standing as a major participant in the global ship repair industry by creating a more favourable regulatory environment (Button, 2022).

2.4 Regional Attractiveness for Shippers

The aspect of attractiveness is important for ship repair sector in the broader maritime industry. Munim and Schramm (2020) concur that the attractiveness of a port or ship repair facility is a crucial determinant of a port's competitiveness within the global maritime industry. Thus, shipowners and operators assess numerous aspects such as port efficiency, geographic location, pricing structures, infrastructure quality, and service diversity, prior selecting repair locations (Goolam & Walters, 2018). It is critical for ship repair operations to balance cost, convenience, and technical capacity to maximise operational efficiency since these factors jointly impact decision-making processes (Munim & Schramm, 2020).

Globally, competitive ship repair hubs are influenced by three key factors: geographic positioning, cost competitiveness, and diversity of vessels and cargo (Turchaninova et al., 2019). This is consistent with the OECD's results, which highlight how price, location, and specialisation affect the choice of repair facilities (OECD, 2020). The geographical location is one of the key considerations for the ship repair operations, which are highlighted in the section below.

2.4.1 Geographical Positioning

Munim and Schramm (2020) argue that in the global maritime network, geographic positioning is widely recognised as a crucial factor in determining port attractiveness, influencing decisions on port selection, transit costs, and overall service efficiency. Accordingly, ports strategically located along key international shipping routes benefit from reduced vessel deviation distances, lower fuel consumption, and quicker turnaround times, thereby boosting their competitiveness for time-sensitive services such as ship maintenance (Wilmsmeier & Monios, 2020). However, Wilmsmeier and Monios (2020) emphasise that although proximity to important maritime trade routes is crucial, inland transportation costs also have a significant impact on overall logistical costs, as the longer distance between ports and hinterland markets increases supply chain costs.

Within this context, the Port of Ngqura demonstrates a few infrastructural and geographical traits that are linked to competitive maritime hubs. As a deep-water port with contemporary transshipment infrastructure, Ngqura is positioned to accommodate large container boats operating along high-traffic east–west shipping lines linking Europe, Asia, and the United States of America. According to Wang and Notteboom (2022), existing port geography and network studies suggest that ports located along such corridors are well positioned to attract vessel-related services, including maintenance and repair activities, due to their ability to minimise operational disruption and downtime for shipowners.

If sufficient funding is allocated to specialised repair infrastructure, such as dry docks or floating docks, as well as the development of skilled technical labor, Ngqura has the potential to provide quicker and more efficient repair services than more established South African ports like Cape Town and Durban, which have comparatively higher levels of congestion (Notteboom & Rodrigue, 2021).

The Eastern Cape’s locational advantage is further reinforced by Ngqura’s role within emerging South–South trade corridors, which enhance connectivity between African, Asian, and South American markets. Increased vessel traffic and a greater need for port-based services, such as maintenance and repair, have been linked to the expanding significance of these trade routes (Wilmsmeier & Monios, 2020). Nevertheless, despite these geographic advantages, the absence of dedicated ship repair facilities constrains Ngqura’s capacity to derive value from this trade. The port’s potential to serve as a strategic ship repair hub in the Eastern Cape is probably going to remain underutilised in the absence of focused investment in repair facilities and auxiliary institutional frameworks.

2.4.2 Cost Competitiveness

International rivalry, shifting operational costs, and changing technology and regulatory requirements all have an increasing impact on the cost dynamics of the global ship repair sector. In a highly competitive ship repair market, issues like price structures, operational and labour expenses, capital investment needs, and expected returns on investment play a major role in determining the competitiveness of repair facilities (Notteboom & Rodrigue, 2021). Notteboom and Rodrigue (2021) indicate that to minimise turnaround time and operational downtime, which have a direct impact on vessel profitability, shipowners usually choose repair yards based on the best possible balance between cost effectiveness and quality service.

South Africa's substantially reduced labour and operating costs, relative to existing ship repair centres in Europe and East Asia, present a possible competitive advantage for the Eastern Cape in attracting repair activity (Mthembu & Chasomeris, 2023). Notteboom and Pallis (2023) are of the view that cost advantages alone are insufficient to secure sustained market share. The region's capacity to translate reduced costs into real competitive gains is hampered by the ongoing infrastructure shortcomings, restricted dry-docking capacity, and inefficient services.

2.4.2.1 Competition Within South Africa: Durban and Cape Town's Market Dominance

Competitiveness is an integral part of the ship repair and maintenance sector. In this regard, within the South African ship repair sector, the Eastern Cape faces intense competition from Durban and Cape Town, both of which benefit from superior infrastructure, economies of scale, and a broader range of integrated maritime services (Notteboom & Rodrigue, 2021). The concentration of established graving docks, floating dock facilities, and specialised marine engineering services in these ports has enabled them to develop strong reputational advantages and sustained dominance within domestic and regional ship repair markets (Notteboom & Pallis, 2023).

Therefore, a critical structural limitation to the Eastern Cape's competitiveness lies in the institutional control of dry-dock infrastructure by the Transnet National Ports Authority (TNPA), which constrains private-sector participation and limits competitive dynamics within the regional repair industry (Mthembu & Chasomeris, 2023). On the contrary, according to Notteboom & Rodrigue (2021), ports like Durban have profited from increased private sector

participation in maritime services, which has increased operational flexibility, innovation, and service efficiency.

Without targeted policy reform and investment frameworks that enable private sector participation, the Eastern Cape's ship repair sector is likely to remain structurally uncompetitive, unable to match the efficiency, service diversity, and market reach of South Africa's dominant repair hubs (Notteboom & Pallis, 2023).

2.4.2.2 Global competition: The Threat from Asia and the Middle East

Beyond domestic competition from Cape Town and Durban, the Eastern Cape's ship repair sector must contend with intensifying global competition from established global ship repair hubs. This competitive pressure is driven by structural and operational advantages in ports and repair facilities abroad (Mdanat et al., 2024). Zhang et al. (2024). For instance, major maritime hubs in Asia, such as China and South Korea, benefit from advanced infrastructure, extensive dry-dock capacity, and integrated logistics networks, which enhance operational efficiency and reduce vessel turnaround times. These features, combined with government-backed incentives and cost-effective labour, make these ports highly attractive to international shipowners seeking reliable and low-cost repair services (Mdanat et al., 2024).

Similarly, Middle Eastern hubs leverage their strategic location along high-traffic trade routes and substantial investment in specialised repair infrastructure to capture a growing share of the regional maritime maintenance market (Mdanat et al., 2024). The combination of infrastructure quality, institutional support, and integration with global shipping networks ensures that these hubs maintain competitive advantages over underdeveloped repair sectors, including the Eastern Cape.

Consequently, without targeted investment and policy reform, Eastern Cape ports are unlikely to match the efficiency, service quality, and cost competitiveness of these established global competitors (Mdanat et al., 2024). This competitiveness could influence cargo and vessel diversity which is further explored in the subsequent section.

2.4.3 Cargo and Vessel Diversity

The maritime industry depends on ports that can handle a variety of ship types and cargo because they provide flexibility and the opportunity to specialise in specialised repair services like tanker maintenance, container vessel refit, or RO-RO operations (Wilmsmeier & Monios, 2020). Ports support global supply chains as important entry points to international trade, enabling cargo consolidation, transshipments, and buffering shipping volume variations (UNCTAD, 2022). Vessel calls and related service demand, such as ship maintenance, are shaped by the effectiveness of port operations, which increasingly influences their appeal to international shipping lines (Mthembu & Chasomeris, 2023).

According to Delfin-Ortega (2025), ports serve as important assets for regional economic and social growth as well as integrated transportation hubs. In the context of the Eastern Cape, patterns in vessel activity emphasise the interdependence between port operations and ship repair companies. Port throughput is influenced by global economic cycles and technological shifts in shipping, which in turn directly affect repair demand; for example, expansions in vessel size and complexity necessitate more specialised repair services, linking port cargo and vessel diversity to the economic viability of local ship repair activities (UNCTAD, 2024).

The economic impact of diverse port operations is evident: ports handling larger vessels and a mix of cargo types experience increased demand for specialised services, including maintenance and repair (Heilig et al., 2021). Post-pandemic recovery in global shipping has also introduced both opportunities and challenges for the ship repair sector. Larger, more technologically advanced vessels require higher skill levels from repair companies, while fluctuations in port activity can create periods of underutilisation, affecting revenue streams (Heilig et al., 2021).

At the regional level, vessel types and traffic patterns reflect the Eastern Cape ports reflect the region's economic priorities and industrial composition. At East London, the port primarily accommodates general cargo, liquid bulk (tanker), and roll-on/roll-off (RO-RO) vessels, supporting manufacturing, petrochemical, and logistics sectors through specialised infrastructure such as automotive and tanker berths, multipurpose quays, and related cargo handling facilities (TNPA, 2021).

Ngqura, as a modern container and bulk-handling port, reflects the growing importance of containerised trade and regional shifts toward integrated logistics and industrial hubs. Its capacity to handle bulk dry vessels supports mining and agricultural exports, reinforcing the port's role in facilitating South Africa's participation in global commodity supply chains (TNPA, 2021).

Port of Port Elizabeth exhibits even more adaptability by taking in passenger, bulk liquid, and car/vehicle cargo vessels. The port's ability to serve a variety of industries, including chemicals, tourism, and automobile manufacturers, makes it a multipurpose marine hub that can satisfy both established and new sectoral needs (TNPA, 2021).

2.5 Market Potential and Investment Opportunities

The Eastern Cape's ship repair industry presents untapped growth potential, propelled by a strategic location along key global shipping routes, increasing port activity, and emerging infrastructure investment opportunities (Smith, 2020). With the growth of international trade volumes, the need for efficient, cost-effective, and strategically positioned ship repair facilities continues to rise. However, capitalising on this potential necessitates a focused approach to addressing infrastructure deficiencies, enhancing service offerings, and attracting private-sector investment (UNCTAD, 2025).

2.5.1 Vessel Arrivals and Cargo Handling

The potential development of the Eastern Cape as a competitive ship repair hub is closely linked to the composition and frequency of vessel arrivals, as well as the nature of cargo handled at its ports. Luo and Yip (2020) argue that ship repair demand is not uniformly distributed across vessel types; rather, it is strongly influenced by cargo characteristics, vessel design, and operational intensity. Their view is that regions that successfully align repair infrastructure with dominant vessel categories are more likely to capture value from routine maintenance and unscheduled repairs.

Container ships, bulk carriers, and vehicle carriers are among the various types of vessel traffic handled by the Eastern Cape's main ports, Port Elizabeth, Ngqura, and East London (TNPA, 2023). Although the region's poor repair infrastructure keeps it from capturing higher-value

maintenance and unscheduled repair work, the varied vessel traffic indicates a potential market for ship repair services. This is consistent with more general port economics theory on value capture and service differentiation, which contends that ports can only obtain higher-value maritime services when infrastructure and capabilities match vessel-specific requirements (Notteboom, Pallis & Rodrigue, 2022).

Vehicle carriers calling at the Port of Port Elizabeth, which serves as the main export gateway for South Africa's automotive industry, present a substantial potential. Automotive logistics rely significantly on roll-on/roll-off (Ro-Ro) vessels, which require specialised dry docking, hull inspection, and mechanical repair due to their structural design and high operational frequency (Kalghatgi, Seratella & Hagan, 2019).

Despite the Eastern Cape's high concentration of automobile exports, the region's capacity to internalise the repair and maintenance tasks related to this traffic is constrained by the lack of specialised dry dock facilities that can house vehicle carriers (Matekenya & Siyanda, 2025). This reduces prospects for local value addition and, from an economic standpoint, represents a structural mismatch between cargo throughput and supporting maritime services.

Beyond vehicle carriers, bulk carriers and container vessels constitute a steady source of demand for routine maintenance, emergency repairs, and regulatory compliance work, particularly as vessels age and environmental standards tighten (Kokosalakis, Merika & Merika, 2021). These types of vessels usually need specialised workshops and docking facilities; therefore, the Eastern Cape's capacity to handle such operations is constrained by its inadequate repair infrastructure. Consequently, despite a strong and varied cargo base, the region continues to lose opportunities to expand ship repair as a value-adding marine service.

2.5.2 Investment Strategies

The investment landscape of the global ship repair industry has transformed, transitioning from state-controlled operations to a framework that promotes private-sector participation and international partnerships (Notteboom, Pallis & Rodrigue, 2022). Public sector ownership of ship repair facilities was common in the past, with governments renting infrastructure to private repair firms. However, shifting economic policies, heightened competition, and the need for modernisation have resulted in privatisation, joint ventures, and business consolidation,

allowing for outside investment and technical know-how (Notteboom, Pallis & Rodrigue, 2022).

South Africa's port governance framework remains largely state-controlled, which has constrained private sector participation in port infrastructure investment (Dawson, 2020). This national governance structure is paralleled in the Eastern Cape, where investment in ship repairs and maintenance remains fragmented and dominated by state-controlled port administrations (TNPA, 2023). The area will find it difficult to compete with international repair hubs without a well-defined, focused investment strategy.

2.5.2.1 Global Investment Models: Lessons for South Africa

The global ship repair industry demonstrates that investment models vary significantly between state-led and market-driven frameworks. In some emerging maritime hubs, government-led investment has been instrumental in creating large-scale repair infrastructure and attracting international operators. For example, the Dubai Maritime City concept, which involves the development of dedicated ship repair zones in Dubai, is frequently cited as a deliberate state strategy to build maritime capabilities through large capital investment and imported technical expertise (Alhashmi & Dutta, 2020). This model emphasises infrastructure-led growth, where government funding reduces barriers to entry and enables rapid development of specialised repair facilities.

However, South Africa's fiscal constraints limit the feasibility of replicating such large-scale public financing. National budget pressures and competing developmental priorities suggest that the Eastern Cape cannot rely solely on government funding to build ship repair capacity (National Treasury, 2023). Consequently, alternative investment mechanisms are required to mobilise private capital and technical expertise

In contrast, Singapore's market-driven maritime cluster allows private sector investment in ship repair without direct government control of repair facilities thanks to a competitive regulatory environment and industry-friendly regulations (Osman, Sundarakani & Reve, 2022). To draw in foreign businesses and maintain high service standards, the Singaporean model emphasises the significance of investment incentives, skill development, and efficient regulations. While

this method involves considerable governmental adjustments, it offers a possibly more realistic future for South Africa than full public ownership.

2.5.2.2 Encouraging Private-Sector Investment: Public-Private Partnerships (PPPs) and SEZs

The lack of strong incentives for private sector investment is a major barrier to the Eastern Cape's ship repair industry's growth. High capital costs, inadequate infrastructure, and lax regulatory frameworks deter private investment in many developing maritime economies (Moodley, 2021).

Public-Private Partnerships (PPPs) provide a useful model of funding infrastructure by allowing risk sharing and utilizing private funds and technical know-how while upholding public control (Ittmann, 2017). PPP models can similarly lessen the financial burden of ship repair infrastructure while guaranteeing competitive and technologically advanced facilities. They have been extensively used in port infrastructure development to finance and modernise docks, terminals, and ancillary maritime facilities (Ittmann, 2017).

A promising opportunity for attracting investment lies in leveraging the Special Economic Zone (SEZ) framework, particularly within the Coega/Ngqura SEZ, adjacent to the Port of Ngqura (Turok, 2019). SEZs are appealing to both domestic and foreign investors because they provide substantial tax benefits, streamlined regulatory procedures, and infrastructure support (Qumba, 2023). The Coega SEZ, due to its proximity to a deep-water port, shows substantial potential as a maritime services hub, if investment is oriented toward ship repair infrastructure expansion (Nel & Rogerson, 2021).

Beyond PPPs and SEZ incentives, targeted fiscal initiatives such as tax reductions and subsidies could further promote private-sector participation by reducing capital expenditure burdens and improving the long-term viability of repair facilities (UNIDO, 2018). However, the success of these strategies depends on coherent policy coordination, clear regulatory frameworks, and credible public governance areas where South Africa has historically faced challenges (National Treasury, 2020).

2.6 Conclusion

The literature reviewed in this chapter highlights the interrelationship between port operations, infrastructure development, and the performance of the ship repair industry. The Eastern Cape has persistent challenges such as infrastructural deficiencies, limited modern repair facilities, constrained private-sector investment, and policy misalignment that continue to inhibit the region's ability to fully exploit its strategic maritime position. Despite these constraints, the literature consistently identifies substantial latent potential for the Eastern Cape to develop into a competitive regional ship repair hub, supported by its advantageous geographic location, relative cost competitiveness, and diverse vessel traffic.

The review suggests that the growth of the ship repair industry in the Eastern Cape is contingent upon targeted infrastructure enhancement, particularly the development of dry docks, floating docks, and specialised repair services capable of accommodating bulk carriers, container vessels, and vehicle carriers. Investment mechanisms such as Public-Private Partnerships (PPPs), complemented by targeted government incentives available through Special Economic Zones (SEZs), emerge in the literature as viable strategies to mobilise capital, share risk, and modernise repair infrastructure while reducing the fiscal burden on the state.

Furthermore, integrating regional activities with global marine trends, such as the increased emphasis on sustainable shipping practices and green retrofits, will guarantee the Eastern Cape's ship repair business remains relevant and competitive in the long run. By nurturing a trained workforce, adopting technology improvements, and boosting port operations, the region has the potential to expand South Africa's maritime industry and attract a broader range of international clients. By taking a comprehensive approach, the Eastern Cape will be able to establish itself as a key participant in the worldwide ship repair market, promoting sector innovation and economic growth.

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology adopted to investigate the ship repair industry in the Eastern Cape, with an emphasis on the industry's potential for future growth and economic impact. The methodology outlines the research approach and data generation processes used in this study. According to Creswell and Creswell (2018), it is an overarching plan, and techniques utilised to combine the several study components. It comprises the analytical methods, data gathering plan and philosophical underpinnings that govern the research process. The selection of a research technique guarantees that the study is both methodologically sound and capable of successfully answering the research questions (Creswell & Creswell, 2018).

The desktop research approach explored in the study was the technique used for data collection. Data collection is the systematic method of acquiring information relating to the research objectives and questions. This systematic process of data collection was guided by the following main research question:

What factors impact on the ship repair industry of the Eastern Cape region and its future development?

The following sub-research questions complement the main research questions:

- 1 Why has the ship repair industry in the Eastern Cape not reached its full potential?
- 2 What constraints limit the development of the ship repair capacity across the Eastern Cape's major ports (Port Elizabeth, East London, and Ngqura)?
- 3 What opportunities could the Eastern Cape region offer for ship repair services compared to other South African and regional ship repair hubs?

This chapter discusses in detail the desktop research methodology which was used to explore the challenges and opportunities for the Eastern Cape region's ship repair and maintenance sector. The subsequent sections of the chapter outline the secondary data collection procedure and selection criteria applied in this study, as well as the data analytical approach. This is an integral part of the study because it illuminates the descriptive and quantitative aspects of the

findings on the complexity of factors impacting the ship repair industry in the Eastern Cape region and its future development opportunities.

3.1.1 Desktop Research Method

Desktop research, also known as secondary research, is the process of gathering and analysing data previously published or compiled by other organisations (Saunders et al., 2019). Saunders indicates that the desktop approach uses a range of secondary data sources including statistical databases, scholarly studies, government publications, industry reports, and market evaluations, are used in this method. By utilising readily accessible data to synthesise findings and derive meaningful insights, desktop research eliminates the need for primary data collection (Bell et al., 2022).

The desktop research approach was selected for this study due to its suitability for addressing the research objectives in a time-efficient and cost-effective manner. Considering the scope of the study, analysing the ship repair industry's economic impact and future development, secondary data sources provide reliable and comprehensive information on cargo volumes, vessel types, and regional economic trends (Yin, 2017). The approach aligns with the study's focus on historical and industry-specific data, which is crucial for understanding patterns, trends, and opportunities for industry growth.

This study used a desktop research method as a suitable data collection process. For Sekaran and Bougie (2020), effective data collection is essential for ensuring that the study's findings are accurate, credible, and aligned with the research objectives. Therefore, for this study, secondary data were drawn from credible, reputable sources such as government publications, industry analyses, academic studies, and port authority reports. Collecting quantitative data linked to cargo volumes and vessel types at Eastern Cape ports was the focus. These factors were selected because they are closely linked to the economic activities and growth potential of the ship repair business.

This study benefited significantly from using the desktop research method to generate critical data on ship repair and maintenance, including its challenges and opportunities. The desktop research approach offers several advantages that make it an effective method for this study. It is highly economical and time-efficient, as it eliminates the need for primary data collection

and extensive fieldwork (Saunders et al., 2019). This approach reduces data collection costs while allowing researchers to focus on analysis using readily available secondary data sources. Furthermore, desktop research provides a broad scope by enabling access to a wide range of pre-existing data (Sekaran & Bougie, 2020). In this study, credible existing data became a significant resource, allowing a broader understanding of the ship repair industry, including market dynamics, competition benchmarks, and historical trends.

Moreover, desktop research ensures data reliability by utilising reputable sources such as port authorities, government reports, and industry associations (Saunders et al., 2019). It also facilitates comparative analysis through the examination of relevant variables, aligning with the study's analytical focus on identifying key patterns and growth opportunities within the ship repair industry. By combining broad data coverage with reliable sources, the desktop research method provided an essential foundation for generating insights that informed the study's conclusions.

3.1.2 Justification for Selecting Desktop Research

The decision to choose a desktop research approach is supported by the alignment with the research questions and objectives of the study. Access to historical and present data is essential to examine the economic impact and growth potential of the ship repair industry, and secondary sources offer this information comprehensively. Additionally, the desktop method supports trend analysis (Sekaran & Bougie, 2020), which is a fundamental component of this study. The desktop approach enabled access to data that provided means for the comparisons of cargo volumes and vessel types arriving at Eastern Cape ports as the area of study.

Creswell and Creswell (2018) indicate that, in comparison to primary research methods such as surveys or interviews, desktop research reduces the possibility of biases in participants. Given the geographically dispersed nature of the Eastern Cape region as a research site, collecting primary data would have been logistically challenging and resource intensive. Yin (2017) argues that desktop research overcomes these challenges by utilising extensive databases and previously published literature from authoritative sources.

Moreover, the design's focus on examining patterns and relationships ensured that the study contributes knowledge to the field of maritime research. The descriptive research design offers a systematic exploration of the industry's economic effect and growth potential, giving a solid

platform for policymakers, industry stakeholders, and future researchers to make well-informed decisions (Babbie, 2020).

3.2 Research Design

Research design refers to the framework that is used to address the research questions and objectives outlined (Creswell & Creswell, 2018). According to Neuman (2019), this framework in question serves as a structured plan that guides the researcher in collecting, analysing, and interpreting data to meet the objectives of the study. For this study, the quality of the data collected from ship repair sector literature, its analysis and interpretation were critical for an understanding of the ship repair sector industry from a global to local context. By establishing a systematic approach, research design ensures that the methodology aligns with the objectives of the study and provides a coherent strategy for achieving significant results (McCombes, 2025).

This research design was in line with a study of this magnitude and detail, focusing on a less researched but highly important maritime industry. Accordingly, a descriptive research design was more suitable for this study, given the nature and complexity of the Eastern Cape port system ship repair industry. Descriptive research aims to systematically characterise the characteristics of a phenomenon and examine correlations between variables (Sirisilla, 2023). This fits well with the study's emphasis on spotting patterns in cargo volume and vessel types as well as evaluating the wider ramifications for the growth of the local economy and industries.

The descriptive research design has several advantages that make it ideal for this study. Firstly, it enables thorough analysis of the phenomenon under study, allowing researchers to use organised data to identify patterns and linkages (Sirisilla, 2023). In this study, the descriptive research approach enabled a thorough analysis of the ship repair industry. By using accessible secondary data, the study examined patterns and linkages emerging from the data, offering an across-the-board understanding of the ship repair industry's current state and future potential.

Secondly, this research design allows the researcher to look at important variables, including cargo throughput and vessel arrivals, throughout pre-established time periods. The descriptive study design makes trend analysis easier (Babbie, 2020). This makes it easier to identify the industry's growth prospects and obstacles.

Another key advantage of descriptive research is its adaptability to incorporate multiple data sources such as government reports, port statistics, and industry studies, ensuring a multifaceted perspective on the research subject (Neuman, 2019). Furthermore, the descriptive design reduces bias and subjective interpretation by producing findings based on reliable, validated data (Babbie, 2020).

A descriptive research design was used for this study due to its alignment with the study's purpose and its ability to address the research questions. The descriptive design supports a deep examination of the elements impacting the ship repair sector and gives a practical understanding for future development. The descriptive strategy produces reliable results while avoiding the financial and logistical challenges of primary data collection by focusing on secondary data (Neuman, 2019).

3.3 Research Approach for this Study

A quantitative research approach was adopted for this study, as it aligns with the objectives of analysing numerical data pertaining to the ship repair industry (Creswell & Creswell, 2018). This approach is suitable for examining measurable variables, such as cargo volumes and vessel types, which are essential to understanding the economic impact and potential growth of the industry (Neuman, 2019). This approach became handy in exploring the various factors affecting the Eastern Cape region of the three ports under this study.

There are several advantages of using a quantitative research approach. Firstly, it allows for the precise measurements and statistical analysis possible, by facilitating the collection and analysis of numerical data (Babbie, 2020). This is essential for finding correlations, identifying trends, and patterns within the ship repair industry. Secondly, by using the standardised methods and tools that the approach relies on, the influence of researcher bias is reduced (Bryman & Bell, 2019). Furthermore, the quantitative approach enhances generalisability (Saunders et al., 2019), as findings derived from numerical data can be applied to broader contexts within the maritime industry. For example, analysing the number of ships accommodated, repaired, or maintained at a given time provides critical insights into the industry's growth potential, operational viability, and service reliability.

Another advantage of the quantitative research approach is the adaptability for comparative analysis, since it permits the evaluation of variables over time or across different areas (Saunders et al., 2019). This provides insight into market dynamics and development prospects, complementing the study's focus on cargo volumes and vessel types. Furthermore, the quantitative approach provides replicability, as the methodology and conclusions may be systematically duplicated by other researchers (Bryman & Bell, 2019).

The quantitative research approach was used for its ability to thoroughly and methodically address the research questions (Johnson & Christensen, 2020). The approach offers unbiased and reliable insights into the economic impact and growth potential of the ship repair industry by focusing on numerical data. The method's focus on statistical analysis aligns with the analytical goals of the study, ensuring that findings are supported by empirical data (Field, 2018).

Moreover, the quantitative approach complements the advantage of the quantitative research approach is the adaptability for comparative analysis, since it permits the evaluation of variables over time or across different areas (Saunders et al., 2019). This provides insight into market dynamics and development prospects, complementing the study's focus on cargo volumes and vessel types. Furthermore, the quantitative approach provides replicability, as the methodology and conclusions may be systematically duplicated by other researchers (Bryman & Bell, 2019).

3.4 Data Collection

The data collection process was methodically designed to ensure accuracy, relevance and reliability.

3.4.1 Data Selection Criteria

For this study, the sources of data were selected based on credibility and alignment with the objectives of the study. Data from reputable publications by the Transnet National Ports Authority (TNPA), peer-reviewed academic sources and government publications were used. These sources were chosen to ensure the authority and reliability of the information. For this

study, selected data focused on trends related to two major variables, namely cargo handling volumes and vessel arrivals. The data collected period spanned 10 years, from 2015 to 2024; however, instances in which data was unavailable have been explained. This timeline was chosen to capture long-term trends, detect patterns, and assess advancements in the ship repair business. A ten-year timeframe provides a strong dataset that reflects economic cycles, market dynamics, and policy changes, ensuring that the research is extensive and insightful. A basis for well-informed impressions and comparisons is provided using secondary data, which provides access to past data that has been carefully recorded and examined (Yin, 2018).

3.4.2 Data Compilation Process

To ensure accuracy and consistency, a systematic approach was used in the data compilation process. Cargo handling data and vessel arrival data were extracted from annual Transnet National Ports Authority reports, which are considered reliable sources for operational statistics in the maritime sector (TNPA, 2024). To enhance the accuracy of the dataset, several sources were cross-referenced, addressing potential discrepancies and verifying the accuracy of the information. This triangulation process, defined as the use of multiple data sources or methods to cross-verify findings and enhance validity, helped ensure that the data used in the study is consistent and reflective of actual industry conditions (Flick, 2018).

3.4.3 Advantages of Secondary Data Collection

Secondary data collection has several benefits. Firstly, secondary data does not require primary data collection methods like surveys or interviews, therefore cost-effective (Smith, 2024). Secondly, the data is readily available from established sources, and this saves time (Neuman, 2019). Thirdly, secondary data provides a broader scope of information, such as historical trends and in-depth analyses that would be difficult to obtain through primary research (Yin, 2018). Additionally, the use of verified and reliable sources ensures data accuracy and dependability, enhancing the study's overall validity (Bell et al., 2022).

3.4.4 Justification for Using Secondary Data Collection

Secondary data collection was used based on process alignment with the research objectives and the ability to provide reliable and accurate information. The ship repair industry is a documented sector, with data available from reputable sources such as port authorities and maritime industry reports. By choosing secondary data collection, the study was able to utilise this information to analyse key trends and patterns effectively.

Furthermore, secondary data collection reduced logistical challenges and resource constraints, allowing the researcher to focus on data analysis and interpretation, rather than data collection (Saunders et al., 2019). This approach ensured that the study was conducted effectively while maintaining a high level of accuracy and reliability.

3.5 Data Analysis

Data analysis refers to the methodical process of examining, cleaning, transforming, and interpreting data to extract meaningful insights and address the research questions (Saunders et al., 2019). This process involves arranging data in a manner that highlights trends, patterns, and relationships relevant to the study's objectives (Babbie, 2020). It ensures that the collected data is transformed into useful information that aids in well-informed decision-making (Bryman, 2016).

3.5.1.1 Cargo Handling

The analysis of cargo handling at the Eastern Cape ports, Port of Ngqura, Port of Port Elizabeth and Port of East London provided an understanding of the level of economic activity within the regional maritime sector. Analysing cargo volumes is a commonly used quantitative technique for assessing port performance and broader economic activity (Ayesu & Boateng, 2024).

In line with trend-based analysis techniques employed in transport and logistics research, the study evaluated how changes in port throughput impact the need for ship repair services by examining historical and present cargo volume data (Saunders et al., 2019). To identify growth areas and potential need for specialised repair and maintenance services, the data were

categorized by type of cargo (such as bulk, breakbulk, and containerized cargo). Categorical data analysis offers clearer identification of sector-specific trends within complicated datasets (Bryman, 2016).

3.5.1.2 Vessel Arrival Information Analysis

A detailed analysis of information on vessel arrivals by vessel type was conducted to determine the kinds of ships frequenting Eastern Cape ports. These comprised bulk carriers, fishing vessels, tankers, and container ships. One established technique for evaluating port usage and related maritime service demand is the analysis of vessel traffic patterns (Yu et al., 2024).

In order to assess alignment with the current capacity of the area ship repair industry, the study evaluated the information on the repair and maintenance requirements related to various vessel classes and correlated these with arrival frequencies. This sort of comparative and correlational analysis is commonly utilised in quantitative maritime and transport studies to identify infrastructure gaps and investment possibilities (Saunders et al., 2019).

3.5.2 Advantages of the Chosen Analytical Techniques

The selected analytical techniques offered several advantages that rendered them highly appropriate for this study. Firstly, the techniques ensured strong alignment with the research objectives, as the focus on cargo handling and vessel arrivals directly supported the study's aim of evaluating the economic impact and growth potential of the ship repair industry. These metrics provide critical insight into the operational activity at Eastern Cape ports, which is central to understanding demand dynamics for ship repair services.

Secondly, these tools facilitated trend identification by permitting the evaluation of patterns and shifts throughout time. The study can determine market trends and new prospects that could affect the region's competitiveness in the ship repair industry by analysing data on vessel arrivals and cargo handling volumes (Notteboom & Rodrigue, 2020).

Thirdly, the methods made it possible to compare data, which is essential for evaluating the industry's growth. The study provides a comprehensive view of the industry's performance by comparing several time periods and identifying quantifiable signs of development, stagnation, or decline.

Lastly, the analytical techniques produced actionable insights by identifying key drivers of demand and potential constraints within the ship repair industry. These findings are important for stakeholders, port authorities, industry participants, and policymakers, as they provide a basis for strategic planning and targeted interventions to address barriers and optimise opportunities for growth.

3.5.2 Justification for the Analytical Approach

The chosen analytical techniques were selected because they provide a comprehensive and quantifiable assessment of the industry's performance. By focusing on cargo handling and vessel arrivals, the study ensures that the analysis remains rooted in measurable variables, thereby enhancing the reliability and validity of the findings (Saunders et al., 2019). Furthermore, as quantitative port performance indicators are frequently used to evaluate port activity, economic contribution, and service demand, their usage is consistent with accepted marine research techniques (Notteboom & Rodrigue, 2020).

Finally, these analytical techniques support data-driven decision-making by enabling stakeholders and policymakers to prioritise investments and strategies that are aligned with observed trends and emerging opportunities (UNCTAD, 2022). This aligns with the broader aim of the study to provide actionable insights for enhancing the ship repair industry's competitiveness in the Eastern Cape.

3.6 Measures Taken to Ensure Ethical Compliance

Although this study relied on secondary data, ethical compliance was maintained through several key measures. To ensure reliability and prevent deception, data were obtained solely from reliable, publicly available platforms (Saunders et al., 2019). The study avoided the use of confidential or proprietary information, and no personal identifiers were disclosed. No personal identifiers were revealed, and no proprietary or secret information was used in the study.

To reduce bias and maintain objectivity, the analysis was undertaken methodically and cross-referenced against various sources where available, so ensuring consistency and accuracy. To

prevent plagiarism and maintain academic integrity, all findings were presented truthfully, openly, and with complete acknowledgement of sources (Creswell & Creswell, 2018). Additionally, the study conformed with institutional requirements; ethical permission was received from the University of KwaZulu-Natal Ethics Committee prior to the initiation of the research, even though the study employed secondary data, thereby assuring full adherence to ethical norms.

The study is based entirely on secondary data obtained from publicly available sources, such as port authority reports, government publications, and industry analyses. As no human participants were involved, and no personal or proprietary data were collected, the study posed minimal ethical risk. Nevertheless, ethical principles such as accuracy, transparency, and academic integrity were upheld throughout the research process (Bryman, 2016).

3.7 Conclusion

This chapter outlined the research methodology used to examine the ship repair industry in the Eastern Cape, with a focus on its economic impact and potential for future growth. A desktop research approach was employed, utilising secondary data from credible sources such as government publications, port authority reports, and industry analyses. This approach provided a cost-effective and time-efficient means of analysing key factors influencing the industry's performance and development potential.

A descriptive research design was used to systematically examine trends and relationships within the ship repair sector. The study employed a quantitative research approach, focusing on measurable variables such as cargo handling volumes and vessel arrivals. Secondary data collection facilitated access to comprehensive and validated information, while analytical techniques enabled trend identification and comparative analysis to extract meaningful insights. These methods ensured that the study remained objective and that findings were supported by empirical evidence.

Through the use of reliable data sources, transparency, and objectivity, ethical considerations were upheld throughout the research process. Overall, the methodological decisions made in this chapter provide a solid and trustworthy basis for addressing the study's goals and offer insightful contributions to the field of maritime research.

CHAPTER FOUR

4. ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis and discussion of empirical findings derived from secondary quantitative data on vessel arrivals and cargo handled at the Eastern Cape's three commercial ports: the Port of East London, the Port of Ngqura, and the Port of Port Elizabeth. In line with the research methodology outlined in Chapter Three, the chapter adopts an analytical approach to examine patterns of port activity over the period 2015 to 2024, subject to data availability and reporting consistency.

The information analysed is structured around two fundamental indicators of port performance: vessel arrivals by vessel type and cargo throughput by cargo category. These metrics were selected due to their strong linkage to port operational dynamics and their relevance in assessing the scale, frequency, and nature of demand for ship repair and maintenance services. Vessel arrival data provides insight into the intensity and composition of maritime traffic, while cargo throughput data offers contextual understanding of port function, vessel characteristics, and operational orientation (Chen et al., 2024).

The chapter focuses on functional diversification within the Eastern Cape port system rather than assessing growth in isolation. By comparing vessel and cargo patterns across ports, the analysis identifies distinct operational roles shaped by infrastructure, cargo specialisation, and integration into national and global trade networks. This comparative approach enables a nuanced assessment of how port activity translates into differentiated ship repair opportunities, including variations in repair frequency, technical complexity, and economic value.

Where data gaps and inconsistencies exist particularly with respect to missing years and variations in cargo classification, these limitations are explicitly acknowledged and incorporated into the analytical framework. This ensures transparency while allowing for structurally grounded interpretation of medium-term trends. Collectively, the findings presented in this chapter establish a foundation for evaluating the economic impact and future development potential of the ship repair industry in the Eastern Cape.

4.2 Analysis of Vessel Arrival

Strategically important to South Africa's maritime trade are the Eastern Cape ports, Port of East London, Port of Ngqura, and Port of Port Elizabeth, each of which specialises in a variety of vessel types that correspond to their geographic location and the regional economic activities they support (TNPA, 2022). Analysing vessel arrivals by vessel type and gross tonnage provides a critical lens through which the operational character of each port can be understood and, importantly, allows for an assessment of the nature, intensity, and technical complexity of ship repair demand generated within the region (Sheikh, 2025).

Each port in the Eastern Cape has developed distinct patterns in the types of vessels they accommodate. Distinct patterns in vessel composition across the three ports reflect deliberate port planning decisions, trade specialisation, and evolving global shipping trends (TNPA, 2022). These patterns have direct implications for the ship repair industry, as different vessel classes impose varying requirements in terms of repair frequency, technical sophistication, regulatory compliance, and infrastructure support (UNCTAD, 2023).

Table 4 illustrates pronounced asymmetries in vessel composition and scale across the three ports. These asymmetries are not merely operational characteristics; they have direct implications for the type of ship repair services sought, the skills intensity of labour, and the potential for value creation within the regional maritime economy.

Table 4: Vessel Arrivals by Port and Vessel Type (2015 – 2024)

Vessel Type	East London (No.)	East London (GT)	Ngqura (No.)	Ngqura (GT)	Port Elizabeth (No.)	Port Elizabeth (GT)
General Cargo	16	277882	283	4 972 957	261	6 197 486
Bulk Dry	94	2 981 244	802	28 450 531	2140	73 519 809
Bulk Liquid	119	1 560 052	223	4 227 195	476	5 261 420
Container Non-Cellular	160	2 465 309	3242	226 774 243	1320	55 938 625
Total Tankers	633	18 497 574	516	11 632 247	817	15 937 142
Passenger Vessels	85	2 578 445	4	419 680	193	9 260 768
Car/Vehicle Carriers	676	33 865 679	0	0	803	48 186 465
RO-RO	276	16 937 291	1	59217	357	21 051 804
Miscellaneous	92	370 584	75	1 250 015	616	1 132 005
Total	2,151	79,534,060	5,146	277,786 ,085	6 ,983	236 ,485 ,524

Source: Compiled from Transnet National Ports Authority vessel arrival data (2015 – 2024)

4.2.1 Overview of Vessel Activity at Eastern Cape Ports

Table 4.1 demonstrates significant divergence in both vessel numbers and aggregate gross tonnage across the Eastern Cape ports. The Port of Port Elizabeth records the highest number of vessel calls (6,983), followed closely by Ngqura (5,146), while East London records a substantially lower 2,151 vessel calls. However, when gross tonnage is considered, this position changes significantly.

Ngqura dominates in terms of aggregate gross tonnage, recording approximately 277.8 million gross tons, exceeding both Port Elizabeth (236.5 million gross tons) and East London (79.5 million gross tons). This divergence between vessel frequency and tonnage highlights a critical

analytical distinction: East London serves a specialised, medium-sized vessel niche, while Ngqura operates as a high-capacity, heavy-tonnage port and Port Elizabeth functions as a high-frequency, multi-purpose port (Nelson Mandela University, 2025).

From a ship repair perspective, this distinction is critical. High-frequency ports typically generate recurrent, lower-value repair work such as inspections, mechanical servicing, and compliance-related maintenance (Jović et al., 2024). In contrast, high-tonnage ports tend to generate lower-frequency but higher-value repair demand, including propulsion system overhauls, structural steel repairs, and dry-docking operations (Jović et al., 2024).

The vessel composition across the ports further reinforces these functional differences. Ngqura's dominance in container non-cellular vessels (over 226 million gross tons) and bulk carriers position it as a port servicing large, technically complex vessels, while East London's comparatively smaller but more specialised vessel mix points toward niche repair opportunities rather than volume-based repair activity.

4.2.2 Port Specific Vessel Activity and Focus

4.2.2.1 Port of East London

The Port of East London exhibits a vessel arrival profile characterised by functional specialisation rather than scale (TNPA, 2025). Although it accounts for the lowest aggregate gross tonnage among the three ports, its vessel mix is strategically significant from a ship repair standpoint. East London records 676 car and vehicle carrier calls, 276 RO-RO vessels, and 633 tanker calls, alongside notable general cargo and bulk liquid activity.

This vessel composition aligns closely with the Eastern Cape's automotive manufacturing base and liquid bulk handling activities. Car carriers and RO-RO vessels are particularly maintenance-intensive due to their reliance on mechanical loading systems, hydraulic ramps, and cargo-securing mechanisms. These vessels typically require frequent short-cycle repairs, inspections, and mechanical servicing rather than large-scale structural interventions (Karatuğ, Arslanoğlu & Guedes Soares, 2023).

A distinct aspect of repair demand is introduced by the significant presence of tanker vessels. Tankers must undergo routine hull inspections, ballast system maintenance, and environmental

compliance tests in accordance with strict international regulatory frameworks, such as MARPOL and SOLAS standards (IMO, 2022). Although these vessels may not be the largest in the regional system, their compliance-driven maintenance requirements generate stable and recurring demand for specialised repair services.

Economically, this profile positions East London as a labour-intensive repair node, where employment generation and skills development are driven by the frequency of vessel interactions rather than capital-heavy infrastructure (TNPA, 2025). The port's vessel mix supports the viability of small-to-medium ship repair enterprises, offering steady income streams and localised economic multipliers within the regional economy (Parola, Pallis, Risitano & Ferretti, 2018).

4.2.2.2 Port of Ngqura

In contrast, the Port of Ngqura presents a vessel arrival profile dominated by scale and technical intensity (Amoah & Mlonzi, 2025). The port records 3,242 container non-cellular vessels, accounting for approximately 226.8 million gross tons, alongside substantial bulk dry traffic (802 vessels, 28.5 million gross tons). This dominance reflects Ngqura's role as a deep-water port specifically designed to accommodate large, modern vessels operating on global trade routes (Amoah & Mlonzi, 2025).

Container vessels and large bulk carriers require extremely specialised repairs. These vessels typically require advanced propulsion system maintenance, high-voltage electrical work, diagnostics of automation systems, and periodic dry-docking (Karatuğ, Arslanoğlu & Guedes Soares, 2023). While the frequency of repair interactions may be lower than at East London, the economic value per repair event is significantly higher.

Russo (2024) presents evidence that ports designed around certain vessel types, such as container or bulk ships, focus on throughput efficiency. In this context, Ngqura's limited presence of RO-RO, passenger, and automotive vessels indicates a narrow operational focus, prioritising throughput efficiency over functional diversity. From a ship repair development perspective, this suggests that Ngqura's long-term contribution to the regional economy will depend on its ability to attract capital-intensive, high-value repair investments, such as floating

dry docks, heavy-lift cranes, and specialised engineering facilities (Mthembu & Chasomeris, 2023).

Failure to align ship repair infrastructure with Ngqura's vessel profile risks the port functioning primarily as a transit hub, with repair expenditure leaking to competing ports such as Durban or international repair yards (Mdanat et al., 2024).

4.2.2.3 Port of Port Elizabeth

The Port of Port Elizabeth demonstrates the most balanced vessel profile among the Eastern Cape ports. With 6,983 vessel calls and 236.5 million gross tons, the port supports substantial activity across bulk dry, bulk liquid, container non-cellular, tanker, RO-RO, and car carrier categories.

Notably, Port Elizabeth records 803 car and vehicle carrier calls and 357 RO-RO vessels, reinforcing its role within South Africa's automotive export value chain. Simultaneously, the port accommodates significant container and bulk traffic, resulting in a diversified repair demand structure. This diversity enhances Port Elizabeth's resilience as a ship repair location. Unlike highly specialised ports, diversified ports are less vulnerable to sector-specific downturns and are better positioned to support multi-disciplinary repair clusters, combining mechanical, electrical, structural, and compliance-related services (Jovic, 2022).

According to Sun, Zhang and Wu (2022), diversified and industrially integrated port enterprises can promote interactive development between port activities and the urban regional economy, which, when considered alongside detailed operational data from the TNPA (2026), highlights how Port Elizabeth's mixed vessel profile supports enhanced employment, supplier clustering and backward economic linkages.

4.2.3 Vessel Activity Trends and Implications for the Ship Repair Industry in the Eastern Cape

While Sections 4.2.1 and 4.2.2 established the structural composition of vessel activity across the Eastern Cape ports, the following section examines how these patterns translate into differentiated ship repair demand and longer-term economic implications.

The Eastern Cape ports' vessel arrival patterns show structural tendencies that are strongly related to more general changes in the global maritime industry. These trends are not only descriptive indices of port activity; they are essential drivers of demand within the ship repair sector and consequently have direct implications for regional economic impact, employment generation, and long-term industrial development. Since ship repair demand is derived demand, dependent on the frequency, type, and technical complexity of vessels calling at ports (Cullinane and Khanna, 2020), an analysis of vessel activity trends provides a critical foundation for understanding the growth trajectory and strategic positioning of the ship repair sector in the Eastern Cape.

4.2.3.1 Vessel Activity and the Ship Repair Industry

Figure 1 presents a comparative line graph of vessel arrival frequency by vessel type across the Ports of East London, Ngqura, and Port Elizabeth, based on aggregated data from Table 4.1. According to McKinnon et al. (2017), while line graphs are traditionally associated with time-series data, their use here is analytically appropriate as it highlights structural divergences in vessel composition across ports, allowing for a clearer comparison of operational focus and repair-demand intensity.

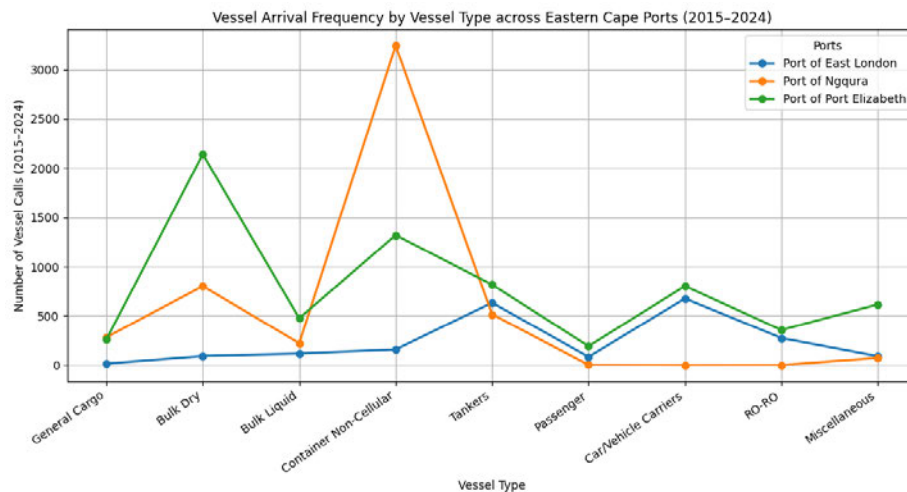


Figure 1: Vessel Arrival Frequency by Vessel Type across the Eastern Cape Ports

Note: The figure illustrates aggregated vessel arrival frequencies by vessel type for the Ports of East London, Ngqura and Port Elizabeth based on Table 4.1

Source: Author's compilation based on Transnet Ports Authority Port Statistics

The line graph indicates substantial dispersion in vessel arrival frequency by vessel type across the three Eastern Cape ports, underlining the distinct roles these ports play within the regional maritime industry. Given that vessel frequency is a key factor in determining repair interaction rates, maintenance cycles, and labour intensity within port-based repair ecosystems, these variations are extremely important for the ship repair sector (Cullinane & Khanna, 2020).

Port Elizabeth demonstrates consistently high vessel arrival frequencies across multiple vessel categories, most notably bulk dry vessels (2,140 calls), container non-cellular vessels (1,320 calls), car and vehicle carriers (803 calls), tankers (817 calls), and RO-RO vessels (357 calls). This broad-based vessel activity profile indicates a port characterised by high operational diversity and frequent vessel turnaround. For the ship repair industry, vessel frequency is a primary determinant of repair interaction rates, maintenance cycles, and labour intensity within port-based repair ecosystems (Cullinane & Khanna, 2020). The high and diversified frequency of vessel calls at Port Elizabeth, therefore, generates a broad and resilient demand structure for ship repair services, supporting employment, skills development, and backward linkages into the regional economy (Mthembu & Chasomeris, 2023).

The economic implication of this pattern is that Port Elizabeth is structurally well positioned to support a labour-intensive, multi-disciplinary ship repair cluster, where employment growth is driven by the cumulative effect of frequent, smaller-scale repair interventions rather than isolated high-value projects (Mthembu & Chasomeris, 2023). This aligns with international evidence suggesting that ports with diversified vessel profiles tend to support more resilient and employment-rich maritime service economies (Notteboom, Pallis & Rodrigue, 2021). In contrast, Port of Ngqura displays a sharply concentrated vessel arrival pattern, with an exceptionally high number of container non-cellular vessel calls (3,242) and substantial bulk dry traffic (802 calls), while recording negligible activity in passenger vessels, car carriers, and RO-RO vessels. This concentration reflects Ngqura's design as a deep-water, high-capacity port focused on large-scale cargo throughput rather than operational diversity (Amoah & Mlonzi, 2025).

This pattern indicates a fundamentally altered demand structure for the ship repair sector. Large bulk carriers and container ships usually have longer maintenance intervals, but they also require more complex repairs that call for specialised equipment, advanced engineering expertise, and capital-intensive infrastructure such as dry docks and heavy-lift facilities (Jia, Li & Meng, 2024). As a result, Ngqura's vessel profile encourages high-value, low-frequency repair events, rather than the constant flow of routine repairs found at Port Elizabeth

This has important implications for economic impact. While fewer repair events may occur at Ngqura, each repair interaction has the potential to generate substantially higher value-added, provided the necessary infrastructure and skills are available locally. In the absence of such capacity, however, there is a high risk of repair demand leakage, with vessels diverting to established repair hubs such as Durban or international shipyards, thereby limiting the local economic benefits associated with Ngqura's vessel traffic (Mdanat et al., 2024).

East London presents a third and distinct vessel activity pattern. While overall vessel numbers are lower than those of Port Elizabeth and Ngqura, East London records notably high arrival frequencies for car and vehicle carriers (676 calls), tankers (633 calls), and RO-RO vessels (276 calls). These vessel types are characterised by high operational intensity and frequent port calls, often linked to short-sea shipping routes and regional trade networks (Tsoukatos et al., 2024).

From a ship repair standpoint, this vessel mix is significant. Automotive carriers and RO-RO vessels rely heavily on mechanical loading systems, hydraulic ramps, and cargo-securing infrastructure, all of which require frequent inspection, maintenance, and repair. Similarly, tanker vessels are subject to stringent international regulatory regimes, resulting in recurring compliance-driven maintenance demand, including hull inspections, tank integrity checks, and environmental safety systems (Traficon et al., 2024).

Economically, East London's vessel activity profile supports a niche, frequency-driven repair market, where cumulative repair demand is generated through frequent, short-cycle interventions rather than large-scale overhauls. This structure is conducive to the growth of small and medium-sized ship repair enterprises, likely supporting employment multipliers and skills development in line with evidence that higher port activity positively impacts local employment (Ayesu & Boateng, 2024).

Taken together, the vessel activity trends illustrated in Figure 1 highlight a critical analytical insight: vessel frequency and vessel size do not exert uniform effects on ship repair demand. Ports with high vessel frequency generate stable, labour-intensive repair demand, while ports dominated by large vessels generate sporadic but high-value repair opportunities (Haralambides, 2023). For the Eastern Cape ship repair industry, this implies that future development cannot rely on a single growth model. Instead, differentiated strategies are required, tailored to the vessel activity profile of each port.

The decline in certain vessel types at some ports, particularly the absence of diversification at Ngqura, also raises strategic considerations about long-term resilience. As global shipping continues to consolidate around larger and more technologically advanced vessels, repair industries that fail to adapt risk exclusion from high-value segments of the maritime economy (UNCTAD, 2023). Conversely, ports such as Port Elizabeth and East London, with diversified and high-frequency vessel traffic, offer opportunities for incremental, inclusive growth in the ship repair sector.

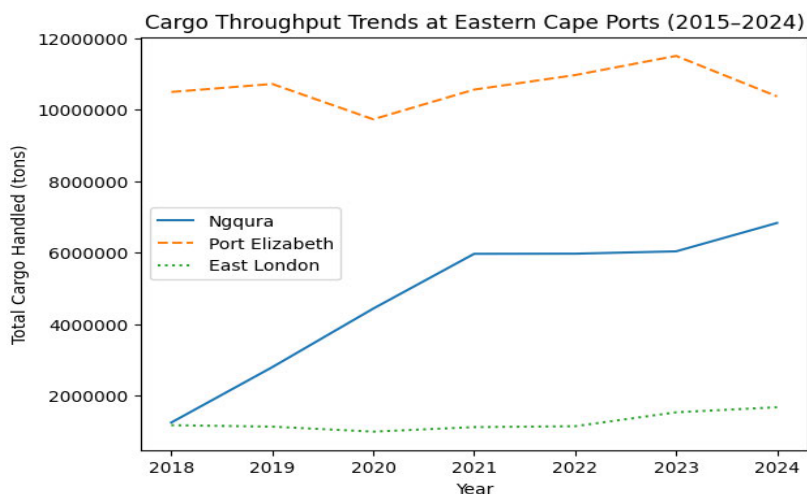
4.2.4 Cargo Handled at Eastern Cape Ports: Contextual Analysis

Cargo throughput is a critical indicator of port activity and economic function, providing insight into the scale, composition, and operational orientation of port systems (Guo et al.,

2025). In the Eastern Cape context, cargo-handling trends at the Port of Ngqura, Port of Port Elizabeth, and the Port of East London reveal clear structural differentiation rather than uniform regional growth. Although the dataset contains gaps for 2016 and 2017, adequate data from 2018 onwards provide a realistic assessment of medium-term trends relevant to port functionality and the development of ancillary maritime industries, including ship repair.

4.2.4.1 Cargo Trends at Eastern Cape Ports (2015 – 2024)

Cargo throughput trends at the Eastern Cape ports are illustrated in Figure 2. The figure shows that Port Elizabeth consistently handles the largest cargo volumes, while Ngqura has experienced marked growth since 2018. In contrast, East London remains relatively small in scale, reflecting its more constrained functional role within the regional port system.



Source: Author's compilation from Transnet National Ports Authority secondary data (2015-2024).

Figure 2: Cargo Throughput Trends at Eastern Cape Ports (2015-2024)

The Port of Ngqura has the most marked growth trend, particularly from 2018 onwards. Cargo volumes increase sharply from just over 1.24 million tons in the latter part of 2018 to more than 7.1 million tons by 2024. This steady expansion validates Ngqura's position as the Eastern Cape's major high-volume cargo gateway, driven largely by bulk dry commodities and containerised trade (TNPA, 2025). From an analytical standpoint, this pattern aligns with

Ngqura's purpose-built deep-water design and its positioning along major international shipping routes, enabling it to accommodate larger vessels and higher cargo throughput than the province's legacy ports.

In comparison, the Port of Port Elizabeth demonstrates stable but less volatile growth. Cargo handled increased steadily from approximately 6.9 million tons in 2015 to a peak of 13.6 million tons in 2023, before moderating slightly in 2024. The relative stability observed at the Port of Port Elizabeth can be attributed to a diversified cargo base, comprising automotive exports, containerised cargo, and bulk commodities.

Previous studies note that ports with diversified cargo structures tend to exhibit greater stability and reduced exposure to demand shocks than ports that rely heavily on throughput growth in a narrow cargo segment (Pluciński et al., 2023). Rather than relying solely on throughput expansion, this diversified cargo structure enhances the port's adaptive capacity and operational robustness. In contrast to Ngqura's throughput-driven growth model, Port Elizabeth's performance reflects a form of resilience grounded in cargo diversity, widely recognised in the port resilience literature as a key factor in mitigating risk and sustaining performance under changing economic and operational conditions (Tsoulfas, 2025).

The Port of East London records the lowest cargo volumes throughout the period, with comparatively modest growth. While total cargo increases from approximately 1.83 million tons in 2015 to around 1.81 million tons in 2024, the absence of significant acceleration indicates structural constraints rather than demand limitations. East London's cargo profile remains concentrated in general cargo and smaller bulk consignments, consistent with its infrastructure limitations and river port configuration (TNPA, 2024).

From a ship repair perspective, these patterns are crucial. Increased vessel throughput and operational intensity are implied by cargo growth at Ngqura and Port Elizabeth, both of which raise demand for maintenance and repair services. However, cargo volume alone does not immediately translate into ship repair activities. Rather than relying solely on volume-based findings, it must be understood in conjunction with vessel type, operational frequency, and port service capability (Mthembu & Chasomeris, 2023).

4.2.4.2 Eastern Cape Cargo Performance in the National Context

Table 5 places Eastern Cape cargo performance within a national framework, enabling a more nuanced assessment of the province's relative contribution to South Africa's maritime economy. Although cargo volumes at Eastern Cape ports have increased over time, their share of total national cargo remains comparatively modest.

Table 5: Eastern Cape Throughput Compared to Total South African Ports

Year	Eastern Cape Ports (tons)	Total SA Ports (tons)	EC Share of National Cargo (%)
2015	Data not available*	Data not available*	–
2016	Data not available*	Data not available*	–
2017	Data not available*	Data not available*	–
2018	12,908,108	227,664,141	5.7
2019	14,643,052	232,660,660	6.3
2020	15,153,063	222,423,319	6.8
2021	17,646,013	217,354,764	8.1
2022	18,081,364	210,998,282	8.6
2023	19,072,872	210,697,413	9.1
2024	18,876,021	210,928,741	8.9

Source: Author's compiled from Transnet National Ports Authority Port Statistics (2015 – 2024)

*2015 figures were reported from January – September only and are not directly comparable with full year data, they are therefore excluded for consistency

Across the analysed years, Eastern Cape ports collectively account for only a small proportion of total cargo handled at South African ports. This finding underscores an important analytical distinction: absolute growth at provincial level does not equate to national dominance or competitive parity with major hubs such as Durban and Cape Town. Instead, the Eastern Cape operates within a differentiated port hierarchy, where scale-based competition is neither realistic nor strategically desirable, as South African ports exhibit varied levels of operational scale, efficiency, and functional roles (Coelli et al., 2025).

Despite this limited national share, the Eastern Cape's cargo performance should not be interpreted as underachievement. Rather, it reflects a structural reality in which South Africa's port system is highly centralised, with a small number of megaports handling the bulk of national throughput. Within this context, the Eastern Cape's ports perform a complementary function, supporting specific trade corridors, industrial clusters, and cargo niches (Mthembu & Chasomeris, 2023).

For the ship repair industry, this comparative insight is critical. Ports with smaller national cargo shares are not inherently disadvantaged in attracting repair activity, because port competitiveness is influenced by a range of strategic factors including location, service quality, and specialised functions beyond sheer throughput volumes (Mdanat et al., 2024). The Eastern Cape's moderate national cargo share therefore reinforces the argument that future ship repair development should prioritise specialisation and service differentiation rather than volume replication, aligning with evidence that port competitiveness increasingly depends on specialised capabilities and value-added services beyond throughput alone (Pérez, González & Trujillo, 2020).

4.2.4.3 Cargo Composition and Port Functional Differentiation

Beyond total throughput, cargo composition provides deeper insight into the functional role of each port and its operational logic. Port Ngqura's dominance in dry bulk cargo underscores a high degree of operational specialisation. Dry bulk cargo is typically associated with large vessels operating on fixed international routes and characterised by high tonnage but lower call frequency (Li, Alexander & Coulon, 2026). This cargo profile reinforces Ngqura's alignment

with scale efficiency and capital-intensive operations, prioritising throughput maximisation rather than cargo diversity (Li et al., 2025)

Port Elizabeth's cargo composition reflects functional versatility. The continued handling of vehicles, breakbulk, dry bulk, and liquid bulk indicates a port ecosystem capable of supporting a wide range of vessel types and trade flows. This diversity enhances operational resilience by reducing reliance on a single cargo stream and strengthens the port's role as a key node within South Africa's manufacturing and export economy. (Notteboom, Pallis & Rodrigue, 2021). East London's cargo composition remains concentrated in smaller-scale bulk and general cargo categories. While this limits its total throughput growth potential, it supports predictable, stable port operations linked to regional economic activity. East London's cargo profile suggests a port that prioritises reliability and regional connectivity over expansion and scale (TNPA, 2024).

These differences highlight that cargo composition, rather than absolute volume alone, is a critical determinant of port function within the Eastern Cape.

4.2.4.4 Implications for the Ship Repair Industry

Although cargo throughput does not directly determine ship repair demand, it provides important contextual signals regarding vessel size, operational intensity, and maintenance requirements (Sapovadia, 2025). Ports handling large volumes of dry bulk and containerised cargo, such as Ngqura and Port Elizabeth, are more likely to attract large vessels, since cargo volume and port infrastructure influence the selection of larger ship classes in global trade flows (Kanamoto et al., 2021). These larger vessels are typically associated with high-tonnage trades and longer-haul routes, reflecting structural characteristics that differentiate them from smaller regional services (Bernacki, 2021). Consequently, ports handling such vessels are better aligned structurally with capital-intensive, specialised ship repair services, including propulsion system maintenance, hull repairs, and compliance-related upgrades (Panayides & Song, 2022).

Conversely, ports with lower cargo volumes but stable operational profiles, such as East London, tend to service smaller or specialised vessels engaged in regional trade. These vessels

generate more frequent but lower-value repair and maintenance requirements, including routine mechanical servicing and minor structural work. This reinforces earlier vessel arrival analysis, which identified East London as better suited to labour-intensive, short-cycle repair services rather than large-scale dry-docking operations (Notteboom, 2020).

Importantly, the cargo analysis complements rather than substitutes the vessel arrival analysis. Together, the two datasets confirm that ports with the highest cargo throughput are not necessarily those with the highest frequency of ship repair interactions. Instead, ship repair potential emerges from the interaction between cargo type, vessel characteristics, and operational patterns, as these factors collectively determine the nature of vessel traffic, service requirements, and maintenance needs within a port system (Zhu & Hsieh, 2024).

4.2.4.5 Data Limitations and Analytical Boundaries

The cargo dataset is subject to notable limitations, including the absence of records for 2016 and 2017 and inconsistencies in the treatment of vehicle cargo across reporting periods. These gaps limit the ability to conduct continuous time-series analysis and precise year-on-year growth comparisons, particularly for assessing short-term trends.

To address these limitations, the analysis focuses on structural and medium-term patterns rather than annual fluctuations. Missing years were excluded from year-on-year calculations, and 2015 data were treated as indicative rather than definitive for comparative purposes. By prioritising port functional roles and cargo composition over incomplete temporal data, the study maintains analytical integrity while avoiding over-interpretation.

The exclusion of these years means that direct comparisons for specific years are not possible, which should be considered when interpreting trends. Nevertheless, this approach allows meaningful insights into port differentiation and cargo dynamics, preserving the validity of the study's findings within the established analytical boundaries.

4.3 Conclusion

This chapter analysed vessel arrivals and cargo handled at the Eastern Cape's three commercial ports to assess their implications for the economic impact and future development of the ship repair industry. The findings reveal a port system characterised by functional differentiation rather than uniform growth, with each port performing a distinct role within the regional and national maritime economy.

Vessel arrival patterns demonstrate that East London operates as a high-frequency, low-tonnage port, Ngqura as a high-capacity port servicing large international vessels, and Port Elizabeth as a diversified, multi-purpose port embedded within industrial supply chains. Cargo-handling analysis reinforces these distinctions, highlighting Ngqura's throughput-driven growth, Port Elizabeth's cargo diversity and stability, and East London's constrained but reliable regional function.

Crucially, the chapter establishes that cargo volume alone is an insufficient indicator of ship repair potential. Instead, ship repair demand is shaped by vessel type, operational frequency, and regulatory complexity (Sapovadia, 2025). Ports such as Ngqura and Port Elizabeth are structurally aligned with specialised, high-value repair services, while East London is better positioned to support frequent, labour-intensive maintenance activities (TNPA, 2025).

By integrating vessel and cargo analysis, this chapter provides a rigorous empirical foundation for evaluating strategic interventions aimed at developing the ship repair industry in the Eastern Cape. It sets the stage for subsequent chapters by demonstrating how port activity patterns translate into differentiated repair opportunities, reinforcing the need for targeted, port-specific development strategies rather than a uniform regional approach.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter synthesises the study's key findings and presents evidence-based recommendations to address the operational and structural barriers impeding the growth of the ship repair industry in the Eastern Cape. It evaluates how the functional differences between the ports of East London, Ngqura, and Port Elizabeth shape ship repair opportunities and constraints. Insights from vessel traffic patterns, cargo throughput, and port functional differentiation are consolidated to highlight the primary hurdles to sector expansion. The chapter also identifies port-specific initiatives to enhance infrastructure, policy alignment, and human capital, providing a foundation for sustainable growth within the region's ship repair industry.

5.2 Conclusion

This study finds that the ship repair industry plays a key role in sustaining global maritime trade by ensuring vessel safety, operational efficiency, and regulatory compliance. As established in Chapter Four, the Eastern Cape ports, Port of East London, Port of Port Elizabeth, and Port of Ngqura comprise a vital element of South Africa's maritime sector, however, each performs a specific functional role dictated by infrastructure, cargo composition, and vessel traffic patterns.

The analysis of information on vessel arrivals and cargo handled over the period 2015 and 2024 demonstrates considerable structural differences across the regional port system. As a high-capacity, throughput-oriented port, Ngqura serves large, technically complex vessels that carry dry bulk and containerised cargo. Port of Port Elizabeth functions as a diverse, multi-purpose port entrenched within automotive, manufacturing, and mixed cargo supply chains. In contrast, the Port of East London operates as a smaller, regionally focused port characterised by lower cargo volumes but relatively high frequencies of specialised vessel calls, including tankers and RO-RO vessels. Similar patterns of functional port differentiation have been observed in other multi-port regions.

These distinctions have direct implications for ship repair potential. Ports such as Ngqura and Port Elizabeth are structurally aligned with high-value, technically intensive repair activities that occur less frequently but generate significant economic returns, especially for large container vessels and bulk carriers. East London, by contrast, is better suited to labour-intensive, short-cycle maintenance and compliance-driven repair services associated with smaller and specialised vessels. The findings confirm that ship repair demand is shaped not only by cargo throughput, but also by the interaction among vessel size, operational frequency, and regulatory complexity.

Despite these prospects, the Eastern Cape's ship repair industry remains constrained by outdated infrastructure, limited repair capacity for modern vessels, skills shortages, and fragmented institutional and policy frameworks. These constraints limit the region's ability to retain repair expenditure locally, diverting repair activity to more established hubs such as Durban and Cape Town. Instead of using a single regional approach to address these issues, targeted, port-specific initiatives are needed.

Original contribution

Building on these findings, this study provides the first comprehensive port-level analysis of ship repair potential in the Eastern Cape, integrating vessel traffic, cargo composition, infrastructure capacity, and regulatory factors. By combining desktop research and quantitative analysis, the study offers actionable insights for policy and operational planning, bridging a gap in the literature and practice.

Limitations

The study relied primarily on secondary data sources, which may vary in reporting accuracy and completeness. The absence of primary interviews with shipping operators limits the ability to capture nuanced industry perspectives. Future research could incorporate these methods to validate and extend the findings.

5.3 Recommendations

The findings of this study indicate that unlocking the growth potential of the ship repair industry in the Eastern Cape requires a set of targeted, port-specific interventions rather than a uniform regional strategy. Central to this is the need for strategic investment in ship repair infrastructure aligned with the functional role of each port.

The analysis demonstrated that ports such as Ngqura and the Port of Port Elizabeth are structurally positioned to service larger, technically complex vessels associated with containerised and bulk cargo. Investment in modern dry docks, heavy-lift equipment, and advanced repair facilities at these ports would enable the region to capture higher-value repair work that is currently diverted to more established hubs such as Durban and Cape Town. In contrast, infrastructure development at the Port of East London should prioritise flexible workshops, mechanical servicing facilities, and compliance-related maintenance capabilities suited to smaller and specialised vessels, thereby reinforcing its comparative advantage in labour-intensive, short-cycle repair services.

Beyond infrastructure development, the Eastern Cape should more effectively leverage its geographic positioning and relative cost advantages to attract ship repair activity. The province's location along major international shipping routes, combined with comparatively lower labour and operating costs, provides a basis for competitive positioning within the regional ship repair market. Evidence suggests that shipowners place significant emphasis on cost efficiency, service availability, and turnaround time when selecting repair locations, particularly for routine and intermediate maintenance activities. Targeted marketing strategies, supported by the development of long-term service agreements with shipping lines and operators, could improve demand predictability and enhance the commercial viability of repair facilities in the region.

Policy and regulatory reform are also crucial to stimulating private sector participation in the Eastern Cape's ship repair industry. The study confirms that fragmented governance structures, lengthy approval processes, and restrictive concession frameworks remain significant barriers to investment. Government intervention through supportive fiscal instruments, such as tax concessions, accelerated depreciation allowances, and investment grants, could improve project feasibility and reduce investor risk. Empirical studies indicate that such incentives are effective in attracting private capital to port-based maritime industries, particularly in emerging

economies. In the South African context, a review of regulatory provisions governing port land use and private participation, including aspects of the National Ports Act (2005), would be necessary to streamline approvals and reduce administrative barriers that currently constrain ship repair development.

Public–Private Partnerships (PPPs) represent a practical mechanism through which many of these challenges could be addressed concurrently. Well-structured PPPs can facilitate access to capital, technical expertise, and operational experience while allowing risks to be shared between public authorities and private investors. International experience demonstrates that PPP-driven ship repair developments have been instrumental in expanding capacity and improving service quality in competitive maritime hubs. For the Eastern Cape, collaborative arrangements involving the Transnet National Ports Authority, private ship repair firms, and international shipyards could support phased infrastructure development aligned with demonstrated demand, thereby reducing the risk of underutilised assets.

Finally, the success of these interventions is dependent upon parallel investment in human capital development. The increasing technical complexity of modern vessels requires a skilled workforce capable of undertaking advanced mechanical, electrical, and regulatory compliance-related repairs. Partnerships between port authorities, industry stakeholders, universities, and technical colleges could support apprenticeship programmes and specialised maritime training initiatives, ensuring a sustainable pipeline of skilled labour. Evidence from comparable port regions suggests that sustained investment in skills development is a critical determinant of long-term competitiveness in the ship repair sector, as shortages of highly skilled maritime workers and the need for adaptive workforce capabilities directly affect industry sustainability and performance. Without addressing skills shortages alongside infrastructure and policy constraints, the Eastern Cape risks remaining structurally dependent on external repair hubs despite favourable geographic and operational conditions.

5.4 Future Prospects

Looking ahead, the ship repair industry in the Eastern Cape holds significant long-term potential to contribute to regional economic development and to strengthen South Africa’s position within the global maritime economy. The demand for ship repair and retrofitting

services is expected to continue, driven by international trade expansion, ageing vessel fleets, and stricter environmental rules. Ports seeking to attract advanced repair activities must invest in modern docking facilities, specialised workshops, and digital diagnostic technologies capable of servicing larger and more complex vessels. Parallel investment in human capital is equally critical, as shortages of skilled artisans and marine engineers remain a persistent constraint. Environmental sustainability will also shape competitiveness, with compliance to international standards and adoption of green repair practices becoming prerequisites for attracting environmentally conscious shipowners.

Policy coherence and institutional coordination will further define the sector's trajectory. Enhancing cooperation between government agencies, port authorities, and private investors is essential to create a regulatory and operational environment conducive to growth

In conclusion, while the Eastern Cape's ship repair industry currently faces substantial challenges, the evidence presented in this study indicates that the region possesses a sound foundation for future development. Through targeted infrastructure investment, supportive policy reform, collaborative partnerships and skills development, the Eastern Cape can establish a resilient and competitive ship repair sector that contributes meaningfully to employment creation, industrial development, and South Africa's broader blue economy objectives.

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Appendix A: Turnitin Report Summary

Siphosihle Mzileni 218085051

ORIGINALITY REPORT

9%	8%	3%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

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Appendix B: Ethical Clearance

HSSREC applicationThe ship repair industry in the Eastern Cape: Economic impact and future development , (Mzileni, Siphosihle (218085051)

NB:

Please click on **Edit** on the top right of the screen to view the full information and make changes to the application. If there is no edit button visible to you, you may be unable to edit the application as it is may be with someone else at the moment.

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Type of ethics review: HSSREC application

Title: The ship repair industry in the Eastern Cape: Economic impact and future development

Date of approval: 24.10.2024

Principal Investigator:

Mzileni, Siphosihle (218085051) - School of Acc Economics&Fin (Ended)

Research site(s):

The research will be carried out through a desktop approach, utilising secondary data sources, including academic publications, industry reports, and other publicly available documents. As a result, no physical research site is required."



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DECLARATION

I confirm that I have proofread and edited the Thesis detailed below, using the Windows 'Tracking' System to reflect my comments and suggested corrections for the author(s) to action.

DETAILS OF WORK COMPLETED

Language & Technical Editing

Document Type: Master's Thesis

Title: The ship repair industry in the Eastern Cape: Economic impact and future development

CLIENT'S DETAILS

Author: Ms Siphosihle Mzileni

Dr Alois S. Baleni
PhD Sociology

SARS Tax No.

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Although the greatest care was taken in editing this thesis, the final responsibility for the product rests with the author.

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DATE

05/02/2026

This certificate confirms the language and technical editing I have done in a personal capacity and not on behalf of any other third party