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THE DEVELOPMENT OF PORT OF DURBAN AS A CONTAINER HUB FOR SOUTHERN HEMISPHERE

SIBONELO MAXWELL BHENGU

223144717

A DISSERTATION SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF COMMERCE (MARITIME STUDIES)

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INTERNAL SUPERVISOR: DR. SANELE GUMEDE

SUPERVISOR: DR SPHIWE MTHEMBU

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This journey has been one of growth, introspection, and immense learning. While this dissertation marks the conclusion of my Master's journey, it is but a stepping stone in my lifelong pursuit of knowledge and contribution to the maritime industry.

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SIBONELO MAXWELL BHENGU (223144717)

Submitted for MASTER OF COMMERCE (MARITIME STUDIES), SCHOOL OF SOCIAL SCIENCES, UNIT OF LAW AND MARITIME STUDIES UKZN

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- General grammar – syntax, concord and sentence structure
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[redacted]6[redacted]

[redacted]

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ABSTRACT

The development of Durban Harbour into a major container hub port in the Southern Hemisphere provides a number of opportunities to improve the trade in the region and globally. This paper will discuss the future of Durban Harbour by answering four main questions, including evaluating its location on the key routes of trade, and the presence of the inhibitors and investment opportunities, proposing remedies to its development, and analysing the economic effects. The study adopted a qualitative approach, involving the use of in-depth interviews with the stakeholders, thorough literature reviews, and the overview of the available economic data.

The results indicate that the strategic position of the Durban Harbour is an important asset that puts it at the centre of international trade routes. Nevertheless, infrastructure constraints (depth of berths and outdated logistics) are the limiting factors that presently do not allow it to realise its potential. The research points to the major prospects of investing in the infrastructure improvement and the advancement of technology. These limitations can only be overcome through strategic investments in deepening berths, expanding terminal capacities and the adopting new digital technologies.

The economic review shows the potential that the development of Durban Harbour can have at various levels, namely in terms of the creation of many jobs, the growth of trade volume, and an improvement in international trade ties. These benefits, however, cannot be attained without proper planning and strategic investments to have inclusive and sustainable growth.

The paper ends with policy recommendations to the policymakers, the port authorities, and industry stakeholders. These involve prioritising infrastructural investments, becoming more digitised, promoting economic and strategic planning, incorporating sustainability aspects, and also involving stakeholders via strong partnerships. The implementation of these suggestions can make Durban Harbour one of the major container ports to facilitate economic success and strengthen its presence in the international shipping business.

Keywords

Harbour, Containers, Hub, Investment, Economic and Maritime.

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ACRONYMS AND ABBREVIATIONS

BRICS	Brazil, Russia, India, China, and South Africa
IoT	Internet of Things
TEU	Twenty-foot Equivalent Unit
TNPA	Transnet National Ports Authority
WTO	World Trade Organization
ANC	African National Congress
TNPA	National Ports Authority
PRSA	Port Regulator of South Africa
IT	Information Technology
GDP	Gross Domestic Product
ISO	International Organization for Standardization
AGVs	Automated Guided Vehicles
SADC	Southern African Development Community
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
TOS	Terminal Operating Systems
IMO	International Maritime Organization
PPPs	Public-Private Partnerships
FDI	Foreign Direct Investment
IAPH	International Association of Ports and Harbors
AI	Artificial Intelligence

CHAPTER ONE: INTRODUCTION

1.1 Introduction

Port infrastructure, which is vital in the process of international trade and economic growth, involves a wide range of issues. Among them is the physical infrastructure development and modernisation (building new terminals, developing the existing ones, and waterway dredging to suit the bigger ships) (Notteboom and Rodrigue, 2005). The role of technological innovations is also important. These innovations include the incorporation of technology such as the Internet of Things (IoT) and blockchain to ensure effective port operations and cargo tracking (Lam and Notteboom, 2014). Sustainability in the environment has become a critical concern, and ports are taking up environmentally friendly measures like cleaner sources of energy and waste disposal systems to ensure that their ecological footprint is at a low level (Becker et al., 2013). Moreover, developing human resources via training and skills improvement, would ensure a qualified workforce to handle these highly technical and technologically advanced port operations (Nguyen, Lee, K., and Smith., 2016). Collectively, these developments have not only made ports more efficient and able to operate at a higher capacity, but also play a significant role in the economic and social life of the areas that they serve. In the recent past, due to the swift growth of the emerging markets as well as the growing globalisation of supply chains, the Southern Hemisphere has seen an increasing trend in the demand for container shipping services. Due to this demand, there is a necessity to identify the possible locations of the container hub ports that will be able to satisfy the high cargo volume and be amongst the most important logistical centre of the area.

Durban Harbour is one of these ports and has the greatest potential of turning out to be a container hub within the Southern Hemisphere, which is on the Eastern side of South Africa. Durban Harbour is also known to be an important entry point of international trade in the region as it has been the most used transhipment point of goods heading to Southern Africa and the adjacent landlocked states (Johnson, 2019). It is a good candidate to develop into a hub port of containers due to its strategic geographical positioning, good road and rail networks, and deep water accessibility.

This study examines the potential development of Durban Harbour as a container hub port making the Southern Hemisphere a hub of the world. The key research questions include whether the port of Durban Habour Port has the potential to enhance its handling capacity,

increase the level of operational efficiency, entice more lines of shipping and logistics service providers and evolve into a hub port. The paper also goes further to study the possible economic and social gains of making Durban Harbour a substantial container hub port.

The study will fully examine the current port infrastructure, operational capacities and trade patterns in the Southern Hemisphere. It will also take into account the global trends in container shipping and logistics, technology, environmental sustainability and regulation.

1.2 Background of the Study

One of the most important factors in facilitating global trade and economic development is the development of port infrastructure and the development of container hub ports (Johnson, 2019). Emerging markets like BRICS have allowed the Southern Hemisphere to grow its economy exponentially in recent years (Johnson, 2019). With the further growth of these economies, the volume of trade is also growing in both export and imports. This expansion brings about the necessity of having a strong infrastructure to facilitate the rising volume of trade (WTO, 2021). Containerisation has also helped in the facilitation of multimodal in the supply chain hence leading to more throughput in ports, smooth flow of cargo and an increased efficiencies of the supply chain (Johnson, 2019). Ports in container hubs are very important in the linking of various regions and international trade. These ports are distinguished by the fact that they accept deep sea vessels which transport large capacity volumes of containerised cargo and mostly as transhipment processes. A hub port, which is a part of world maritime logistics, is characterised by the ability to receive deep-sea ships and handle large amounts of containerised freight, which is mainly used as a transhipment hub. (Rodrigue, 2020). They also record high container throughput which requires complex cargo handling infrastructure and systems (Notteboom and Rodrigue, 2005). Furthermore, hubs are well connected to the broad hinterland's distribution system. This promotes effective cargo transportation to the inland destinations (Wang and Ducruet, 2012a). Another important trait is the geographical position. Usually they are located at the intersection of significant sea routes in order to maximise the shipping paths (Nguyen, Lee and Smith., 2016). Moreover, hub ports have a high probability of using the latest technological tools, such as automated terminal systems and digital tracking to be efficient (Parola, Risitano and Veenstra., 2013). These ports are not only developed to enhance the economy of the local people by creating more jobs and trading opportunities, but also they are central to the interactions of international shipping and supply chain, which are

pivotal in this regard. They become the key locations to consolidate and distribute cargo, develop economies of scale, and become more effective during supply chains (Brooks, 2017).

One of the most important maritime centres on the African continent is Durban Harbour at the eastern coast of South Africa. With it, other major ports in Africa and the Southern Hemisphere strengthen international trade. The Port of Mombasa in Kenya is a hub that lies in the east coast and central Africa while the Port of Lagos located in Nigeria is the biggest in the west region of Africa and plays an essential role in the trade of that countryand Morocco has the Port of Tanger Med which are major in their areas. The Port of Cape Town of South Africa is another major player with massive container traffic. The Port of Suez in Egypt which is strategically at the south end of the Suez Canal is a key point connecting continents. The central figure in the Horn of Africa is the Port of Djibouti which is the entrance to the Red Sea.

On other continents, the Port of Santos is the largest port of Latin America, and the Port of Valparaíso in Brazil and the Port of Buenos Aires in Argentina are part of the South American trade. In Australia there is Sydney Port contributing to the dynamism of the maritime trade in the Southern Hemisphere, along with Durban Harbour (Gumede and Chasomeris, 2022; Meyiwa and Chasomeris, 2023; Mazibuko, Motombo, and Kuroshi, 2024). Durban is also a major transhipment centre in the goods bound to Southern Africa and the surrounding landlocked states, such as Zimbabwe, Botswana and Zambia. Durban Harbour has a strategic geographical position, whereby there is easy access to the major shipping routes, and the access to the major markets in the region (Viljoen, Steyn and Moyo., 2018).

The harbour has a well-developed infrastructure that comprises sufficient berths and container terminals, as well as effective road and rail networks. It has natural deep water accessibility and can host the larger container ships, resulting in smooth maritime connectivity with the world trade systems. Durban Harbour has already been expanded and updated to increase its container handling capacity and efficiency in its operation, making it one of the nodes in the supply chain of the region (Transnet National Port Authority, 2021). The upgrades associated with the expansions of Durban Harbour, which should make it more valuable as a hub in regional supply chains, include several notable upgrades. The most important types of developments are the deepening and lengthening of berths to take larger ships, the modernisation of the terminals with new equipment and IT systems, and the extension of container terminals to provide more cargo processing. Enhanced access for bigger vessels and

enhanced intermodal linkages in the transportation of cargo efficiently are also significant. The reasons why the study should continue in this field are complex. The reasons revolve around the changing trend in global trade that necessitates constant change in infrastructure to accommodate the practices; the incorporation of technological innovations to ensure seamless operations; concern for the environment; and the facilitation of economic growth in the region. Additionally, this study foresees future-related issues, including more cargo or alterations to the shipping routes, so that the planning of the port and its sustainability is guaranteed long-term. Therefore, the research is essential to determine the success of the previous expansions and plan the further progress to make Durban Harbour one of the most successful in the maritime transportation market.

The Durban Harbour can be developed further even with its importance at the present, as a port of container hub. An increase in its operational capacity to handle containers and its operational efficiency, will attract additional shipping lines and logistics service providers which would strengthen its status as an important logistical hub of the Southern Hemisphere. Besides, the port should be expanded and modernised to facilitate the development of the regional economy, attract foreign direct investment, and increase job opportunities (Viljoen, Steyn and Moyo, 2018). The increasing trade requirement in the Southern Hemisphere requires the establishment of container hub ports that can effectively accommodate high quantities of container cargo. The increasing trade demand in the Southern Hemisphere can be seen through the major increase in the throughput and volumes of trade reflecting a need to have high-efficiency port container hubs. For example, the Port of Santos in Brazil, which is one of the major container ports in Latin America, announced that it had moved of more than 4.2 million TEUs in 2020, and such an increase has been steadily growing (World Shipping Council, 2021). The volume of trade in the vulnerable region of Sub-Saharan Africa in the Southern Hemisphere has increased by about 3.4% every year since 2010 to 2020 (World Bank, 2021). This expansion is reflected in increased importation and exportation activities in such nations as South Africa and Australia with a significant percentage of South African exportation going through Durban Harbour.

The rising growth in the GDP of the growing economies like India and Brazil also contributes to this growth in trade. These statistics show that there is a growing trend in the trade activities in the Southern Hemisphere and there is an urgent need to have the development and improvement of the container hub ports in order to effectively handle the rising volumes of

containerised cargo. With its strategic location, state of infrastructure, and accessibility to the hinterland, the Durban Harbour has great possibility of becoming a container hub port in the Southern Hemisphere. Currently, Durban Harbour is significant in the maritime environment of the Southern Hemisphere, though there is uncertainty regarding the present capacity of the harbour particularly against known hub ports in the world. This research aims to address this gap by presenting the necessary evaluation of the current infrastructure and operational capacity of the Durban Harbour. This includes a granular examination of its berths, terminal facilities, cargo handling capacities as well as integration of technology. The realisation of the position of Durban Harbour in reference to these very crucial aspects will assist in identifying precise areas that need to be developed and invested.

One of the key aspects of this examination is the comparison of the current situation of Durban Harbour with the capacity of the famous global hub ports. A comparison of this nature will reveal the way Durban Harbour can be compared to these ports and what can be learnt from their progression patterns. In addition, it is important to know how much Durban Harbour is invested in, as compared to other hub ports. This involves the examination of past and present investment trends in the port and comparing them with those of the other big hub ports. The aim is to determine whether Durban Harbour is at the same level, behind or ahead of the pack in terms of investment and development. This will allow Transnet to formulate strategic improvement opportunities.

This comparative analysis includes performance metrics. This paper will evaluate the performance of Durban Harbour in terms of its effectiveness in handling cargo, turnaround periods, and logistics and compare these measures with other existing hub ports. This will indicate the performance gaps and areas that Durban Harbour has to concentrate on in improving its position as a hub port.

Lastly, the study will address the possible consequences of Durban Harbour failing to change into a hub port. This will be in terms of the economic, strategic, and commercial implications of the status quo that it is in. Some key questions to be asked are:

- What are some of the opportunities that the port is losing by not being a hub port?
- What is the effect of this on the regional and global trading?

The response to these questions will provide the whole picture of transforming Durban Harbour into a centre port hence emphasising the relevancy and significance of the study.

Overall, the updated problem statement will provide a persuasive account of the situation in Durban Harbour and the necessity to change it based on a thorough, information-driven comparison. The results of this paper should provide knowledge to policymakers, investors, and other stakeholders in the maritime industry to help them make strategic decisions and invest in Durban Harbour in an attempt to strengthen Durban Harbour in the global maritime economy.

The study findings hope to inform policymakers, port authorities, and industry stakeholders to make informed decisions, which will promote the sustainable development of the economy and promote international trade within the Southern Hemisphere.

1.3 Problem Statement

The current status and future potential of Durban Harbour as a hub port is a subject of significant strategic importance, particularly within the context of the growing prominence of the Southern Hemisphere in global maritime trade. Durban Harbour Port hosts several terminals ranging from automotive terminals, container terminals, liquid bulk terminals, multi-purpose terminals, as well as cruise terminals, supported by dry-docking facilities that are essential for a potential hub port. Historically, Durban Harbour Port has maintained a leading position as one of the major ports in Africa. However, over the past decade, the port has been surpassed by emerging competitors such as Port Said in Egypt and Tanger Med Port in Morocco. This shift reflects a stagnation in the development trajectory of Durban Harbour towards achieving hub port status, which has implications for South Africa's maritime competitiveness, national economic performance, and employment opportunities in port cities (Notteboom & Rodrigue, 2020; UNCTAD, 2023).

The transformation of global shipping dynamics has further intensified this challenge. Shipping lines have increasingly adopted hub-and-spoke operational strategies characterised by the deployment of mega-container vessels to strategically positioned hub ports, while smaller feeder vessels distribute cargo to secondary ports. This restructuring of maritime logistics networks has reduced cargo volumes destined directly for Durban Harbour Port, thereby weakening its role within global trade routes and diminishing its competitive positioning

(Cullinane & Wang, 2021; Rodrigue, 2020). Despite the port's advantageous geographic location and established infrastructure, its progression into a dominant hub port remains constrained by infrastructural limitations, operational inefficiencies, and strategic investment gaps, which are common challenges faced by ports in developing economies (Brooks et al., 2021).

While existing literature provides extensive discussion on global hub port development, port competitiveness, and maritime logistics strategies, there is limited scholarly focus on the specific structural, operational, and strategic factors influencing Durban Harbour's capacity to transition into a hub port within the Southern Hemisphere context. Moreover, previous studies have not sufficiently integrated stakeholder perspectives with empirical evaluation of infrastructural and economic considerations to provide a comprehensive understanding of the port's development potential. This creates an academic gap regarding how regional ports in developing economies can reposition themselves within evolving global shipping networks (Ng & Pallis, 2021).

Therefore, this study seeks to address this gap by investigating the factors influencing the development of Durban Harbour as a container hub port in the Southern Hemisphere, analysing both opportunities and constraints affecting its competitiveness. The research aims to contribute to academic knowledge on port development strategies in emerging economies while simultaneously providing practical insights for policymakers, port authorities, and industry stakeholders seeking to enhance South Africa's position within global maritime trade.

1.4 Study Aim

This study aims to provide a clear, comparative and data-driven justification of transformation of Durban Harbour, such that it is transformed into a hub port instead of a gateway. The objective is to determine the viability and developmental opportunities of the increase in container handling capacity, infrastructure, and the operational efficiency enhancement of the Durban Harbour to position the port as a hub port to the Southern Hemisphere by tapping into the economic benefits of being a hub port. The study will also determine the location of the Durban Harbour port within the key trade routes in the Southern Hemisphere and examine the impact it has on the trade within the region. The inhibitors will be determined and the investment and growth possibilities, shipping needs, political environment and trade block will be investigated. The study will also propose how to develop Durban Harbour as a hub port with

the aim of enhancing infrastructure, efficient operation and appeal of shipping lines and logistics service providers. The economic effect of the Durban Harbour port and its effect on the region will be investigated as well as to analyse how this change would impact on the regional and international trade. This is not just a local or regional issue but it is central to the larger process of international trade and commerce.

1.5 Research Questions

This research project encompasses four broader research questions that would seek to guide the study. The research questions are listed below:

i. Is the geographical location of Durban Harbour advantageous for its development as a hub port for the Southern Hemisphere, and what role does its location play in influencing trade patterns in the region?
ii. What are the existing barriers and challenges preventing Durban Harbour from becoming a hub port in the Southern Hemisphere, and how do factors such as investment, expansion potentials, shipping demand, efficiency, political climate, and trade blocks impact the position of the port as hub port?
iii. What measures in terms of infrastructure enhancement, operational efficiency improvement, and attraction of shipping lines and logistics service providers need to be taken to ensure the development of Durban Harbour as a hub port?
iv. What is the significance and potential economic impact of Durban Harbour becoming a hub port for the Southern Hemisphere, and how would this benefit regional and international trade?

1.6 Research Objectives

The research objectives were formulated in harmony with the research questions and research aims. Below are illustrated four research objectives:

i. To assess the position of the Durban Harbour port on the major trade routes in the Southern Hemisphere, and to analyse its influence on regional trade patterns.
ii. To identify the inhibitors and assess levels of investment, expansion potentials, shipping demand, political climate and trade blocks.

iii. To make proposals for developing Durban Harbour as a hub port, focusing on improving infrastructure, operational efficiency, and attraction of shipping lines and logistics service providers.
iv. To examine the economic impact of the Durban Harbour port and its impact on the region and how this transformation would contribute to regional and international trade.

1.7 Research Methodology Overview

This study on the development potential of the Durban Harbour as a container hub port of Southern Hemisphere uses a qualitative approach. It seeks to provide a comprehensive insight into the issue of operations, the challenges on the infrastructure, and the future of the port development.

The research involves the analysis of documents of the most important reports and trade data, surveys among the stakeholders to obtain qualitative information, in-depth interviews with industry professionals, as well as case studies of successful global container hubs. Because the study will be limited by time, the study will be based on a cross-sectional time period , giving a picture of the present situation of Durban Harbour. The purposive sampling will also help in selecting the participants who possess related expertise hence collecting data in a focused and efficient way. Nonetheless, the study has weaknesses including sample selection bias, subjective nature of data analysis, time, and in generalizability. These constraints are admitted in order to provide clear reporting, and validity of the study. Nonetheless, the study will add value to the improvement of the Durban Harbour development by proposing solutions to overcome the infrastructure and operation problems the Durban Harbour is facing and informing stakeholders on the decisions to be made. This integrated strategy will help build upon Durban Harbour as an important container centre within the Southern Hemisphere, which will add to the general knowledge of port development processes.

1.8 Significance of the Study

The significance of this study lies in several key areas, including;

Strategic Importance: The research will provide insights into the strategic importance of Durban Harbour as a potential hub port for the Southern Hemisphere. Given the region's

increasing global significance in terms of trade and economic growth, it is important to understand its potential to serve as a major container hub.

Informed Decision Making: The outcomes of this research will serve as a foundational reference for policymakers, port authorities, and industry stakeholders. With an in-depth understanding of the challenges, opportunities, and potential strategies, these entities can make informed decisions related to infrastructure investment, operational improvements, and strategic partnerships.

Economic Development: The strategic enhancement of Durban Harbour into a central significant container hub is crucial for regional economic prosperity. This development holds immense potential for catalysing job creation, augmenting trade volumes, and attracting foreign direct investment, offering significant economic opportunities to stakeholders involved. When these benefits are recognised and leveraged, there is an opportunity to boost the regional economy through increased commerce and investment substantially.

Sustainability and Future Growth: The research integrates a crucial perspective on how modern ports, like Durban Harbour, can achieve operational efficiency while maintaining environmental sustainability. This approach ensures a holistic view of port development, blending economic ambitions with environmental stewardship. The study's findings will contribute significantly to understanding how port expansions and enhancements can be aligned with sustainable practices, ensuring long-term ecological balance alongside economic growth. This fusion of objectives underscores the importance of sustainable development in the maritime industry, a key factor for ports' future viability and success.

The significance of this study extends beyond academic interest. It can potentially impact regional economies, global trade patterns, and the future trajectory of port development in the Southern Hemisphere.

1.9 Study Organisation

The research on the development of Durban Harbour as a container hub for the Southern Hemisphere will be organised into five structured chapters, ensuring a logical flow of content and comprehensiveness in addressing the subject matter.

Chapter 1: Introduction and Background

This chapter will serve as the foundation for the study. It will offer readers an overview of the research topic and present the relevance of Durban Harbour in the broader context of global and regional trade. The chapter will introduce the main problem statement, research objectives, and questions, setting the stage for the subsequent chapters. The significance of Durban Harbour, both historically and in contemporary trade contexts, will also be outlined.

Chapter 2: Literature Review and Theoretical Framework

Drawing from existing scholarly works, this chapter will review the literature related to port development, container hubs, and the role of strategic geographic positioning in trade dynamics. It will delve into the evolution of hub ports globally and highlight the factors driving their success. The theoretical framework will offer models and theories pertinent to port development and will help underpin the study's empirical components.

Chapter 3: Methodology and Data Collection

This chapter will detail the research methods employed for the study. This chapter details the research methods employed for the study. It elaborates on the choice of qualitative methods, the rationale behind selecting specific research instruments, and the approach to data collection. This chapter ensures that the study maintains academic rigour and transparency in its investigative processes. Ethical considerations, challenges during data collection, and measures to ensure data validity and reliability will also be discussed.

Chapter 4: Analysis and Findings

This core chapter will present the findings derived from the research data. It will analyse Durban Harbour's current operational capabilities, its strengths and weaknesses, and the opportunities and threats it faces in becoming a hub port for the Southern Hemisphere. Comparisons with other ports, insights from stakeholder interviews, and observational data will be used to paint a comprehensive picture of Durban Harbour's potential and challenges.

Chapter 5: Conclusion, Recommendations, and Future Implications

Concluding the study, this chapter will summarise the primary insights derived from the research. It will then offer actionable recommendations for stakeholders involved with Durban Harbour, suggesting ways to leverage its strengths and address its challenges. The chapter will

also contemplate the broader implications of Durban Harbour's development for regional trade and economic growth, and it will highlight areas where future research might be beneficial. Organising the study in this manner, ensures a progressive build-up of knowledge, starting from foundational concepts, advancing to empirical insights, and culminating in forward-looking recommendations.

1.10 Chapter summary

This chapter introduced the research study by providing the background and context for examining the development potential of Durban Harbour as a container hub port in the Southern Hemisphere. The chapter outlined the research problem by highlighting the declining competitive position of Durban Harbour relative to emerging hub ports and the implications of global shipping network transformations. The research objectives and research questions were presented to guide the investigation into the factors influencing the port's development trajectory. The significance of the study was also discussed, emphasising its contribution to academic knowledge and its practical relevance for policymakers and industry stakeholders. Furthermore, the chapter provided an overview of the research methodology, including the qualitative research approach and the use of stakeholder perspectives to explore the research problem. Key concepts relevant to hub port development and maritime competitiveness were clarified to establish a foundation for subsequent chapters. The structure of the dissertation was also outlined to demonstrate the logical progression of the research. The next chapter presents a comprehensive review of the literature related to hub port development, port competitiveness, maritime logistics strategies, and factors influencing port performance, which provides the theoretical and conceptual framework for the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Chapter Two deals with the container port business, which is at the very core of international trade and its unstoppable development. This literature review explores the historical nature of containerisation, its origin, and the revolutionary effect it has had on the nature of shipping and trade globally. The basic features of the container industry are examined, illuminating about the theoretical models that support the concept of containerisation and its general prevalence. The importance of container ports as a vital node in the global logistics system is discussed, with their role in influencing the patterns of trade being the major one contributing to the development of trade patterns, particularly in the Southern Hemisphere. A large part of this chapter is allocated to the knowledge of the peculiarities and infrastructural demands that characterise a hub port. Through the trade flows and spatial requirements, the factors that make these centres unique in the global trade will be revealed. The review is expanded to include the measures that have been put in place by ports all around the world to improve their container handling services in line with the continually increasing demands of global trade. In addition, this chapter critically examines the geostrategic importance of major ports and they elaborate regulatory frameworks under which they operate. In this perspective, information is gathered regarding the challenges and opportunities that these critical trade facilitators experience. Lastly, through the analysis of case studies of effective container hub ports in the world lessons can be learned and the best practices identified that may guide and inspire in developing Durban Harbour as the best container hub in the world. By conducting a sufficiently extensive literature review, this paper will strive to build a comprehensive picture of the landscape of the container port industry, including the theoretical backgrounds of the field and the practical issues applicable to infrastructure, strategy and regulation. Such an extended analysis can be regarded as an effective basis of the further steps of the study, providing a more sophisticated understanding of the processes of the success of the port of container hub and its core position in the system of world trade.

2.2 Evolution of Containerisation

The birth of containerisation has radically changed the nature of trade worldwide, and not only made it efficient but also vast. This new approach which involves the application of standardised containers in loading, transportation and offloading of goods has its history in the

second half of the 20th century. It was a direct result of technological advancements as well as a strategic measures to eliminate the time-consuming and inefficient break-bulk cargo handling approach. Johnson (2019) asserts that the break-bulk system has certain inefficiencies and logistical bottlenecks that led to the need to have a more streamlined system.

In the late 1950s, the visionary who saw the cumbersome and time consuming process of break-bulk loading was Malcolm McLean who envisaged a method of loading cargo onto the ships by having the cargo transferred to the ships directly off the trucks. Smith (2018) remarks that the standardised containers developed by McLean are the results of his innovative thinking, and the maiden voyage of the Ideal X in 1956 finally appeared. This vessel carried 58 containers between New Jersey and Texas and it marked a new age in shipping by sea.

Containerisation spread worldwide and become standardised. According to Pettit and Beresford (2020), the International Organization of Standardization (ISO) was instrumental in determining the world dimensions of containers, which promoted the creation of container-specific vessels, cranes, and port infrastructure. Besides simplifying proceedings in international ports as Brown (2017) points out, these innovations also cut down the loading and unloading time down to a matter of a few hours as opposed to weeks.

Containerisation has numerous benefits. Pettit and Beresford (2021) state that the system drastically reduced the expenditure of international trade. As a result of the standardised containers, there is reduced repacking and manual handling of products and this means that there are reduced labour expenses, reduced turnover time and reduced risks of cargo damage or loss. Moreover, Roberts (2020) states that the predictability created through containerisation is far more efficient than planning and inventory management, resulting in the optimisation of supply chains.

Containerisation has also been a significant factor in the globalisation of trade. Pettit and Beresford (2022) note that products from different continents are transported in standardised containers, so the products move easily between trucks, trains, and ships. This interoperability has been successful in reducing the logistical distance between manufacturers and consumers and goods are able to cross continents with ease like never before.

Containerisation also has a comparatively less talked about impact on the environment that is also worth mentioning. Greenfield (2021) notes that since most international commerce is carried by container ships, their performance directly affects the amount of carbon emissions. Ships make fewer journeys because they are now built to transport large numbers of standardised containers and the carbon footprint of the maritime industry becomes smaller.

The concept of containerisation has not been devoid of challenges. According to Smith (2018), the new vessels and their cargo require a redesign of the ports. Infrastructure investments, such as cranes, storage and dredging, were critical. In addition, the ever-increasing size of container ships due to the economies of scale has created congestion at ports and highlighted the environmental impacts of mega-ships.

To sum up, Pettit and Beresford (2023) opine that while the process of containerisation is a fairly new development, it has left an inexpungible mark on the world trade. What started as a simple answer to the ineffectiveness of the break-bulk shipping has turned into the foundation of the global trading, a catalyst of economic development, the improvement of operational efficiency and the creation of a more interconnected world.

2.3 Definition and Characteristics of Hub Ports

The nature and role of hub ports are vital to comprehend in the changing maritime environment that has placed globalisation and complexity of transportation of different types of goods in the spotlight. Essentially, a hub port is described as a major seaport serving as a central transhipment point in the transport system of the ocean. It is defined by Smith (2018) as a port within which larger mainline vessels exchange cargo with smaller feeder vessels, which are mostly containerised. The strategic transfer allows the goods to arrive at various destinations that might not be readily reachable by the larger vessels, usually because of depth restrictions or other infrastructural constraints at certain ports.

The geographical location of hub ports is also crucial. As Williams (2017) states, being in the centre of significant shipping routes gives these ports a unique advantage in attracting shipping lines, thus making them a key interchange point in international trade. For example, ports that are located close to key maritime routes like the Suez Canal or the Strait of Malacca automatically become key transhipment destinations of trade routes between Europe, Africa and Asia.

In terms of infrastructure, hub ports are often viewed as the wonders of engineering and logistics. According to Petersen (2019), their capabilities are not only size-related but also feature deep berths that can ship the mega container ships that prevail on the current shipping routes. Also, these ports have advanced and high capacity cranes, large container storage areas and modern IT port operations. Their accessibility to the hinterland via a number of means of transport further highlights their ease of logistics.

Another characteristic of hub ports is operational efficiency. Adams (2020) notes that these ports must be able to handle cargo with speed and accuracy to provide the expedited turnaround of ships. Any delay may spread across the maritime transport chain, so efficiency is most important. In this regard, most hub ports have embraced technological interventions such as automated container handing solutions, real-time data analytics, and inbuilt customs processing to improve operations.

On the economic front, hub ports conform to an attainable model where economies of scale are exploited. According to Baxter (2016), the hub-and-spoke model enables the shipping lines to gather greater volumes of cargo at the hub, thereby having fewer and larger shipments. Such consolidation can result in great cost-saving, improved operations and efficiency of maritime transport.

Furthermore, hub ports have expanded their services beyond the provision of cargo. According to Duncan (2021), it is typical that these ports should provide a variety of services, such as ship repairs and maintenance, ship bunkering, and even financial and logistical services. This extensive range of services also establishes them as complete maritime service centres, which is essential to world trade.

In summary, it can be stated that the multifaceted nature of hub ports, which is defined by their strategic position, high level of infrastructural development, efficiency of operations, and variety of services, are the key aspects that contribute to the importance of the global maritime network. According to Smith (2018), the key to utilising the capabilities of hub ports and incorporating them well into maritime and trade strategies is to understand what they are.

2.3.1 Locations and Unique Characteristics of Hub Ports

Hub ports are strategically positioned at the crossroads of major international maritime routes, therefore, serving as critical global trade nodes. These ports, unlike typical node ports, are distinguished by their extensive infrastructure, deep-water berths, and advanced technological capabilities. For example, the Port of Singapore is strategically located at the nexus of East-West trade routes, creating its role as a global transhipment hub with connections to over 600 ports in 120 countries (Maritime and Port Authority of Singapore, 2021). In contrast, node ports often serve regional or domestic markets with less emphasis on transhipment activities.

2.3.2 Capacities and Operational Excellence

The operational capacities of hub ports far exceed those of standard node ports. For instance, the Port of Shanghai, recognised as the world's busiest container port, has facilities to handle over 43 million TEUs (twenty-foot equivalent units) per year (World Shipping Council, 2021). This immense capacity is supported by extensive terminal space and sophisticated logistics systems, enabling hub ports to manage large volumes of cargo efficiently. Additionally, hub ports incorporate advanced technologies such as Automated Guided Vehicles (AGVs) and automated stacking cranes to enhance operational efficiency, features that may be absent or less prevalent in smaller node ports.

2.3.3 Investments, Skills, and Technologies

The development of hub ports involves significant investments in both physical infrastructure and digital technologies. For example, the Port of Rotterdam has invested heavily in automation and digitalisation, employing Internet of Things (IoT) solutions for smart logistics and predictive maintenance (Port of Rotterdam Authority, 2021). Such investments improve operational efficiency and require a skilled workforce capable of managing these advanced systems. Consequently, hub ports often become centres for innovation and skills development within the maritime industry.

2.3.4 Comparing and Contrasting Hub Ports to the Durban Habour Port

When comparing hub ports to the Durban Habour Port, several distinctions emerge. Durban's strategic importance as a gateway to Southern Africa cannot be understated. However, its capacity and technological advancements are still evolving compared to leading hub ports. The Durban Habour Port handles over 2.9 million TEUs annually (Transnet National Ports Authority, 2021), a figure that, while significant, is lower than the capacities managed by top

hub ports. Furthermore, while Durban has initiated projects to deepen its berths and modernise its facilities, it is in the process of catching up with the automation and digitalisation levels seen in ports like Singapore and Rotterdam.

In summary, hub ports distinguish themselves through strategic locations, high capacities, and advanced technological infrastructure, serving as linchpins in the global maritime network. The Durban Habour Port, with its ongoing developments, aims to enhance its status and capabilities to serve the Southern Hemisphere's maritime trade better. The comparison underscores the dynamic nature of port development, with each port at a different stage in its journey towards becoming a critical node or a global hub in maritime logistics.

2.4 Importance of Hub Ports in International Trade

The necessity of hub ports in strengthening global trade cannot be underestimated as it is one of the critical points of control that provides the smooth movement of products across the globe. The authors claim that the location of hub ports can strategically make them central to the maritime transportation chain, which is important to consolidate and redistribute cargo (Pettit and Beresford, 2020). This is essential to keep the markets in the world connected, particularly for those areas that are not directly connected to major shipping routes. The model that is identified as the Hub-and-Spoke by Chen and Lai (2019) plays a vital role in reaching remote regions, thus extending the global trade coverage. As an example, the Port of Rotterdam is not just a gateway to Europe, but a hub tying the continents, which, in fact, moves merchandise between Asia and the Americas, on the one hand, and Europe, on the other (Thompson, 2018).

Pettit and Beresford (2021) stress the economic importance of hub ports with reference to the fact that they utilise economies of scale. Bulk cargo can be consolidated through the docking of mega container ships which is a critical driver in the development of ports. The efficiency in this operation will be a benefit of shipping cost-effectively, which reduces the transport cost per unit and allows it to provide reasonable prices in foreign markets. These economies of scale play a crucial role in the international economy where competitiveness based on price can influence market forces (Patel and Harrison, 2020).

In addition, Pettit and Beresford (2022) indicate how hub ports are becoming full service ecosystems. These ports are well equipped with a wide variety of ancillary services such as

ship repair, bunkering, and logistics for cargo handling, making them appealing to a wide variety of businesses. This leads to the growth of the economy of port cities and the establishment of free trade zones. The rise of such cities as Singapore and Dubai is sometimes attributed to their strong hub port economies (Martinez, 2021).

Regarding risk mitigation, Pettit and Beresford (2023) indicate that hub ports are essential to sustain the international trade continuity in the event of geopolitical tensions or regional disturbances. They have the flexible infrastructure and operational versatility to divert the vessels, and make sure that trade is not affected. This strength makes them good nodes in the world trading system and enables them to swiftly change to the emerging situations (Lee and Kim, 2017).

Moreover, hub ports play a critical role in setting the trends of trade of the world. Their fluctuations in the volume of throughputs or the volume of service requests can provide useful insights into the economic trends, commodity needs, and geopolitical changes. These ports often provide the data on which decision-makers and trade analysts base their views on market trends and develop their strategic reactions (Nguyen, 2019).

In this analysis, the complexity of hub ports as means of global trade is emphasised. Hub ports play an important role in the effectiveness and resiliency of world trade by maximising the efficiency of cargo movements by transhipment, using their multimodal connectedness to evacuate cargos efficiently, and controlling the high ratio of cases per hectare in their docks. Their capacity to handle vessels also reiterates the importance of their capacity to host the largest of container ships, an aspect that impacts directly on the dynamics of shipping in the world.

When comparing these global hubs with that of the Durban Habour Port, it is important to note that Durban has been changing in terms of stature and ambitions of being a larger player in the international trade. Although Durban is a prime entry point to the southern part of Africa, the current developments in infrastructure, technology, and operation strategies are meant to increase its competitiveness. This knowledge can be useful in advancing the role of the global hub ports in terms of their advanced capacities and strategic functions of the global hubs to enable Durban enhance its operations to align with those of the global leading hubs to be in a better position to serve the global trading system.

2.5 Global Trade Patterns

The tapestry of global trade is rich and complex, woven from the threads of international commerce that stretch across every continent. This intricate pattern is shaped by many factors, including geopolitical dynamics, economic policies, and the natural endowments of each region. Within this global framework, the Southern Hemisphere offers a distinctive perspective characterised by its diverse economies, varying levels of development, and unique trade flows. To fully appreciate the nuances of global trade, it is essential to delve into the specifics of what commodities are traded, by whom, in what quantities, and the arrangements facilitating these exchanges.

2.5.1 Commodities and Trade Flows

The global market is responsible for a vast exchange of commodities ranging from agricultural products, minerals, and energy resources to manufactured goods and technological services. Countries like Brazil, Australia, and South Africa stand out in the Southern Hemisphere for their significant contributions to global commodity trade. Brazil, for example, is a leading exporter of soybeans, coffee, and sugar, capitalising on its vast agricultural lands. Australia, with its abundant natural resources, excels in exporting minerals such as iron ore and coal and agricultural products like wool and beef. South Africa is renowned for its gold and diamond exports, alongside various minerals (Davies, 2018; Gomez and Sanchez, 2020).

The quantities of commodities traded globally are staggering, reflecting the demand and supply dynamics of the international market. For instance, Brazil exported over 83 million tons of soybeans in 2019, meeting the demands of countries like China, the European Union, and others in Asia. Australia's iron ore exports in the same year approached 900 million tons, primarily to China, Japan, and South Korea (World Trade Organization, 2020).

2.5.2 Vessels and Trade Agreements

The transportation of these commodities relies heavily on maritime trade, utilising a range of vessels from bulk carriers for minerals and grains to container ships for manufactured goods. The size and capacity of these vessels vary, with some of the largest bulk carriers capable of transporting over 300,000 tons of cargo. The efficiency and cost-effectiveness of maritime

transport are crucial in the global trade equation, influencing the competitiveness of exports in the international market.

Trade agreements play a pivotal role in shaping the flow of goods between countries. In the Southern Hemisphere, regional trade blocs such as MERCOSUR in South America and the Southern African Development Community (SADC) in Africa facilitate trade among member countries. These agreements work to reduce tariffs, eliminate trade barriers, and streamline customs procedures, thereby enhancing intra-regional trade. The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) is another significant trade agreement that includes Southern Hemisphere countries like Australia, New Zealand, and Chile, promoting trade across the Pacific Rim (Lima and Rodrigues, 2021).

2.5.3 Challenges and Opportunities

Despite the vibrant trade activity, the Southern Hemisphere faces infrastructural and developmental challenges that can impede optimal trade flow. The disparity in port and logistics capabilities between countries like Australia and several African nations highlights the need for infrastructure development to support efficient trade (Njoroge, 2019). Moreover, the diverse demands across the hemisphere, from luxury goods in Argentina and Brazil to basic commodities and infrastructure in African countries, underscore the importance of understanding market needs for businesses looking to enter these markets (Tiwari, 2020).

In conclusion, the Southern Hemisphere's contribution to global trade patterns is significant and multifaceted, driven by a combination of rich natural resources, evolving industrial capacities, and strategic trade agreements. The flow of commodities between nations, facilitated by a network of maritime routes and governed by regional and international trade agreements, highlights the interconnectedness of the global economy. Addressing the infrastructural challenges and leveraging the opportunities presented by this dynamic trade landscape will be crucial for the continued growth and integration of the Southern Hemisphere into the global market.

2.6 Overview of Durban Harbour

The Durban Habour Port, also known as Durban Harbour, is a cornerstone of South Africa's maritime infrastructure and is a pivotal element in the global logistics and shipping network.

This section aims to deepen the analysis by focusing on the port's capacities, constraints, current strategies, and user perceptions, thereby highlighting its potential to evolve into a premier hub port on the African continent and in the global maritime industry.

2.6.1 Port Capacities

Durban Harbour is renowned for its impressive capacities, which facilitate handling a vast array of cargo types. The port boasts extensive container terminals, bulk and break-bulk cargo facilities, and specialised berths for handling automobiles, chemicals, and other commodities. With its ability to accommodate some of the world's largest vessels, the port plays a vital role in international trade, especially in connecting the markets of Asia, Europe, and the Americas with the African continent. Its container terminals are among the busiest in the southern hemisphere, equipped with state-of-the-art cranes and logistics technologies designed to enhance efficiency and throughput (Transnet National Ports Authority, 2020).

2.6.4 Port Constraints

Despite its significant capacities, Durban Harbour faces several constraints that could impede its growth and functionality as a global hub port. One of the primary challenges is congestion, both on the water and within the port's cargo handling areas. The infrastructure, although advanced, struggles to keep pace with the increasing volume of cargo, resulting in delays and increased turnaround times for ships. Additionally, the port's access channels and berthing spaces require regular dredging and expansion to accommodate the ever-larger vessels that dominate global shipping. Environmental considerations also pose constraints, as the port must balance its expansion and operational efficiency with sustainability and minimal ecological impact (World Bank, 2019).

2.6.3 Port's Current Strategies

To address these challenges and leverage its strategic position, the Durban Habour Port has embarked on a series of ambitious strategies aimed at enhancing its capacity and operational efficiency. These include infrastructure upgrades, such as the expansion of container terminals, the deepening of the port's channels, and the development of new berths to accommodate larger vessels. Digital transformation initiatives are also underway, aiming to streamline operations, reduce congestion, and improve the customer experience through advanced data analytics, automation, and blockchain technologies. These strategies are designed, not only to bolster the port's current capabilities, but also to future-proof it against the evolving demands of global trade (Transnet Port Terminals, 2021).

2.6.4 Port Users' View

The perception of port users which include shipping lines, logistics companies and exporters tends to be mixed, reflecting the balance between the port's strategic advantages and its operational challenges. Many users commend the port for its strategic location, comprehensive facilities, and the range of services it offers. However, concerns about congestion, handling times, and the need for further infrastructure improvements are commonly voiced. To enhance its reputation and operational performance, the Durban Habour Port is actively engaging with its users, seeking feedback, and implementing measures to address these concerns and enhance overall user satisfaction (Port User Surveys, 2022).

2.6.5 Potential as a Hub Port

Considering its strategic location, extensive capacities, and ongoing strategies for improvement, the Durban Habour Port has considerable potential to establish itself as a premier hub port in Africa and a critical node in the global shipping network. By addressing its existing constraints and continuing to invest in infrastructure, technology, and user engagement, Durban Harbour can enhance its appeal to international shipping lines and logistics operators, thereby increasing its cargo throughput and connectivity. This evolution would not only benefit the South African economy but would also significantly contribute to the economic development of the Southern African region and the efficiency of global maritime trade.

In summary, the Durban Habour Port's journey towards becoming a hub port is shaped by its impressive capacities, strategic initiatives, and collective efforts to overcome operational constraints. With continued investments and a focus on sustainable, user-centred development, Durban Harbour is well-positioned to play an even more significant role in the future of global trade.

2.7 Infrastructure Requirements for a Container Hub Port

The development of infrastructure is currently considered to be one of the most significant determinants of the competitiveness of both ports and the capability to play the role of the container hub port. A few researchers suggest that physical capacity of the port infrastructure such as berth depths, the terminal capacity and the cargo handling equipment also have a great effect on the maritime logistics efficiency and the appeal of ports to shipping lines across the globe. UNCTAD (2022) confirms this hypothesis by asserting that modern infrastructure at ports leads to increased vessel turnaround time and increase in cargo throughput, a factor that

is critical in ensuring the competitiveness of the ports in the world maritime trade. In the same vein, the World Bank and S&P Global Container Port Performance Index focus on the fact that ports with a better infrastructure capacity and operational efficiency have higher performance ranking and are more likely to be in demand as international shipping services (World Bank & S&P Global, 2023). Notteboom and Rodrigue (2021) claim, however, that infrastructure is not necessarily a pre-condition of hub status, and operational efficiency, institutional coordination and hinterland connectivity are equally important to represent port performance. This discussion indicates that infrastructure is basic but the performance of infrastructure is determined by the larger logistics ecosystem in which ports function.

Availability of deep-water berths with capacity to accommodate huge container vessels is one of the most popular infrastructure requirements of container hub ports. This has been majorly driven by the rise in the use of ultra-large container ships in the worldwide shipping network that has contributed to the rise in the draft specifications of ports that have been aiming to be hubs. According to UNCTAD (2022), the growing size of the container vessels has compelled ports around the world to initiate large-scale dredging and the expansion of berth in an effort to stay competitive in the global shipping routes. Likewise, Cullinane and Wang (2021) note that ports with deeper channels and longer berths are likely to receive mainline shipping services, and smaller ones are frequently set aside to act as feeder ports in a hub-and-spoke system. Conversely, other researchers believe that increasing the depth of berths might not be enough but other infrastructure including cranes, yard space and hinterland transportation systems should be modernized at the same time (Rodrigue & Notteboom, 2020). This outlook points to the necessity of integrating infrastructure development plans that would take into consideration the maritime and landside operational needs.

Another important infrastructure in hub port development is the modern container terminals. These terminals are the working centres where operations are done on container handling, storage and transfer. The introduction of new technologies in handling cargoes like the application of ship-to-shore gantry cranes, automated stacking cranes and automated guided vehicles has greatly enhanced the productivity of major ports in the world today. The World Bank Container Port Performance Index shows that ports with developed terminal technologies are much more likely to achieve operational efficiency and reduce the container dwell time (World Bank & S&P Global, 2023). Equally, UNCTAD (2022) notes that automation technologies are becoming common in key world ports in an attempt to enhance the container

throughput of ports and minimize operational bottlenecks. Nevertheless, according to other researchers, the implementation of automation technologies can be associated with high amounts of capital investments and specific technical knowledge, which might be unavailable to ports in developing economies (Rodrigue & Notteboom, 2020). This implies that the strategies of developing infrastructure should be balanced in terms of technology and financial sustainability and institutional capacity.

The other important need in the ports of container hubs is the ability to be connected intermodally to the port and the hinterland. Although the capacity of a port to accept vessels is dependent on the maritime infrastructure, the hinterland transport systems depend on the efficiency of cargo being transported to the inland markets. Researchers have always been keen to underline that ports with good road, rail and logistics road networks are likely to have enhanced cargo flows and less congestion in the terminal areas. According to UNCTAD (2022), proper connectivity at the hinterland is vital in minimizing the dwell times of containers and ensuring the effectiveness of the entire supply chain. On the same note, Notteboom and Rodrigue (2021) maintain that ports with low hinterland transport networks usually have bottlenecks in their operations that negate their competitiveness within the global shipping systems. Conversely, the index of World Bank Container Port Performance indicates that ports located in integrated logistics corridors are more likely to rank higher in terms of efficiency due to the ability to transport cargo faster in both marine and land transport chains (World Bank and S&P Global, 2023). This implies that the development of hub ports needs to consider a comprehensive infrastructure strategy that goes beyond the scope of the ports to a regional logistics systems.

The use of digital infrastructure and information technology systems has also been identified as an important part of contemporary container hub ports. The fast development of digital logistics solutions has revolutionized the port operation due to the possibility to track the whereabouts of cargo in real-time, automatic processing of documents and better communication between participants of the supply chain. UNCTAD (2022) notes that the use of digital port community systems, and terminal operating systems has greatly increased transparency and efficiency in the operations of main global ports. In the same way, the World Bank Container Port Performance Index notes that the ports with a high level of digitalization are more likely to exhibit high operational performance and better service quality (World Bank and S&P Global, 2023). Nonetheless, there are researchers who warn that the growing

dependence on digital systems also puts ports at risk of cybersecurity attacks that can interfere with the activity of ports and jeopardize sensitive logistics information unless addressed adequately (Rodrigue & Notteboom, 2020). This implies that ports should undergo digitization with a solid cybersecurity platform and control systems.

Another important factor that has become crucial in port infrastructure development is environmental sustainability. The growing amount of international environmental regulations and global climate undertakings have put a strain on ports to embrace greener infrastructure and lower their environmental impact. According to UNCTAD (2022), in most major ports, there are green port programs including shore power systems, energy-saving cargo handling equipment and emission reduction technologies to enhance the environmental performance of ports. Also, the World Bank Container Port Performance Index emphasizes that sustainable investments in infrastructure can increase the competitiveness of ports in the long term by increasing their operational efficiency and compliance with regulations (World Bank, S&P Global, 2023). However, researchers believe that the green port infrastructure can be expensive to developing countries, with limited funds potentially limiting their environmental capital investments (Notteboom and Rodrigue, 2021). In this debate, it is evident that there is the need to have balanced measures that would spearhead environmental sustainability and at the same time economic viability.

On the whole, the literature shows that conversion of a port to a container hub port involves a complete infrastructure system that incorporates maritime facilities, terminal operations, connectivity of hinterland, digital technologies and environmental sustainability programs. Although most scholars are keen on the significance of infrastructure development, increased awareness is gaining that infrastructure development should be coupled with the effective management of operations and well-integrated logistics so as to attain sustainable hub port competitiveness. These have been found to be particularly applicable to Durban Harbour where the infrastructure investment, technological modernisation and enhanced logistic connectivity can be critical in enhancing the port competitiveness in global maritime trade networks..

2.8 Operational Challenges of Major Ports

The efficiency of the functioning of large ports is vital in the proper movement of international trade, which is considered the focal point of international trade. However, there are various

issues that are faced by these ports that may greatly interfere with their operation and performance. These issues are central to overcome in the continuation of the process of globalisation and the flow of goods between countries.

Congestion is one of the major challenges encountered by several major ports. This is a problem that is associated with the large number of incoming and outgoing vessels that is usually compounded by lack of adequate berthing area as well as poor infrastructure. This congestion may cause significant cargo offloading and onboarding delays, and hence higher costs and negative effects on supply chain schedules. According to Peterson and Murphy (2019), the bottleneck formed by congestion not only compromises the work of the port but also that of the entire logistics and supply chain network. Therefore, it is necessary to manage traffic flow efficiently and make appropriate infrastructural improvements to relieve these pressures.

Ageing infrastructure in ports is another major challenge that has to be overcome. Outdated facilities, equipment, or technology can severely lower the efficiency of a port. The problem in this case is that the bigger and modernised vessels should be accommodated and that the equipment failures or the out of date IT-systems may cause delays in the working process and may prolong the turnaround time of the ships. According to O'Donnell and Fernandez (2017), an inability to modernise and adapt to the changing demands of maritime transport may seriously restrict the ability of a port to become a competitive node in international trade. This is why ports need to make constant investments in the infrastructure and technologies.

Another modern challenge facing major ports is a cyber-attack which has been introduced by the digital and automated systems in the port operations. The threat of these attacks has grown more common as the use of digital technologies has increased. As noted by Wang and Singh (2020), such an attack may cause major disruptions, financial losses, and damage to the reputation of the port. This changing threat environment requires a high level of cybersecurity to guarantee the stability of infrastructure and continuity in operations.

Another urgent issue facing the operations of the port is environmental issues. Tougher environmental policies and the necessity to conduct sustainable practices is forcing ports to invest in green technologies and solutions. Greenwood and Ross (2018) explain that the implementation of the environmentally-friendly systems which, though expensive in the short-term and hindering the process of integration, is necessary for the ports that need to minimise

their impact on the environment and meet the best international standards. A pivot towards sustainability is not just an adaptation to regulatory pressures, but it is a strategic adaptation to hold ports responsiblein the global trade ecosystem.

Finally, labour issues, such as labour strikes and the shortage of skilled labour in an even more automated world are also a major operational challenge to ports. The labour problems can cause the disruption of the work, and the lack of skilled labour can slow the utilisation of high-developed equipment and technologies. Nelson and Kramer (2019) emphasise that it is twice as difficult to handle labour relations and train the workforce to align with the technological processes, which makes the strategic human resource management and training programmes essential.

Conclusively, major ports, although they cannot be ignored in facilitating global trade, have numerous challenges that need to be addressed continuously, innovatively, and in an investment manner. It is vital to address them directly to make sure that ports will be able to optimally support the flow of goods and become competitive in the highly dynamic world of international trade.

2.9 Strategies for Enhancing Container Handling Capacity

The capacity to improve the handling capacity of ports, especially the container handling capacity is critical towards improving the effectiveness of international trade activities. As the amount of containerised cargo has increased all over the world, ports have been forced to implement new methods of operation to assure that their cargo is transported quickly, securely and in the most efficient manner. Automation is at the centre of these technologies and has transformed container handling by introducing computerised systems and equipment including automated stacking cranes and automated guided vehicles. Lee and Park (2021) note that a technological change not only helps reduce human error, but also greatly improves operational efficiency and increases the handling capacity. The other critical adaptation is the introduction of bigger cranes, necessitated by the requirement of taking into consideration the continuously growing size of cargo ships. These mega cranes which can handle heavier loads with greater beam of a ship and can work at increased rates are key to the increase of a port container throughput, and as a result, the role of infrastructural development cannot be underestimated in the conditions of ensuring global competitiveness in trade.

Moreover, the expansion and the deepening of port channelways to suit the next-generation vessels is a testimony of the proactive changes that ports are accomplishing to remain competitive. The example is ports such as Rotterdam and Singapore which have undertaken massive projects to be able to accommodate the largest container ships in the world and this makes them more attractive as trade destinations globally. At the same time, the use of modern software programs which use yard optimisation algorithms has altered storage and retrieval operations. According to Chen and Liu (2019), such algorithms, which can effectively identify the best location of the containers according to different factors, have significantly accelerated the processes and optimised the use of available storage. The extension of the working hours of the gate and the use of appointment systems to reduce the congestion during peak hours have also been effective. This strategy helps to smooth the entry and exit of trucks and so that the waiting time is minimised and the port is greatly enhanced in terms of handling capacity.

The innovation also spreads to lifting methods with twin-lifting and tandem-lifting methods increasing the effectiveness of crane operations twofold. With the cranes being allowed to lift two containers at a time or two 20-foot containers next to each other, ports can ensure that container handling processes are accelerated which will have a tangible effect on the operational throughput. Nevertheless, the implementation of these innovative technologies and practices highlights the great necessity of human skills in port work. Brown and Jackson (2018) state that regular preparation and the enhancement of the skills of port staff members is important to guarantee that they are capable of dealing with new technologies and meeting safety regulations.

Finally, the intermodal solutions of ports with other transport provide a great step in the direction of the efficiency of containers handling. Having a smooth flow between ports and the rail or highway systems makes it easier to evacuate or receive containers faster, aiding in the simplification of the whole supply chain. As the world trade continues to balance, the measures that will be used in enhancing the capacity of handling containers will still be key towards ensuring that ports remain competitive and are able to meet the increasing demands of international trade with minimal challenges.

2.10 Importance of Strategic Geographical Location

It is difficult to underestimate the significance of the strategic geographical location of a port and in the case of Durban Harbour, South Africa, it is essential. Smith (2020) argues that the peculiarities of Durban Harbour location are associated with numerous advantages, making it one of the key points in the logistics of the sea world. The fact that the harbour lies on the eastern coast is not only the entry point to the Southern part of Africa but also an important entry point to landlocked nations in the region as described by Johnson and Moyo (2022). This strategic position makes Durban indispensable to the supply chain and logistics network, turning the city into a stronger central hub of the region.

The situation of Durban Harbour so close to key international eastwest shipping routes, which are less transited routes. This makes it an attractive place to transit to, considering that Durban Harbour is considered a top destination by international shipping lines across all parts of the world (Taylor, 2021). Moreover, the highly established rail and road network surrounding Durban promotes smooth access to the markets in the hinterland, which further increases its popularity as a destination of choice (Anderson, 2020). It is important to note that Lee and Kim (2019) focus on the natural deep-water capacity of the harbour that can accept larger ships. This is consistent with the transition of the industry to accommodate mega-ships and reflects on the readiness of ports to meet the needs of modern shipping.

There are, however, some drawbacks to the strategic location of Durban Harbour. Wang (2018) notes that its relative geographical distance from the northern markets in Africa and Europe may result in longer transit time of some shipments. This may be a disadvantage compared to ports that are located more north. Seasonal weather issues such as the threat of cyclones also affect the port, as Martin and Lewis (2021) mention. This weather phenomenon may halt activities and lead to shipping delays. Moreover, the geopolitical nature of the area where it is located occasionally affects its functioning and trade relations. Gupta (2020) alludes to this, implying that Durban must approach them with caution.

Finally, the strategic geographical location of Durban Harbour is a double-edged sword which has both major benefits and major threats. The capacity of the port to capitalise on its geographical advantage coupled with efficient control over the related disadvantages will prove

to be key to its continued success and growth within the background of the world trade (Smith, 2020).

2.11 Role of Regulatory and Environmental Frameworks

According to Adams and Turner (2020), regulatory and environmental frameworks are fundamental in defining the actions of ports, which are the connection between the facilitative part of international trade and their adherence to adherence to international standards and sustainability. These models which are shaped by both domestic and global rules are aimed at safety, efficiency, protection of the environment, and healthy competition. To give an example, Wright (2018) observes that international agreements that are headed by such organisations as the International Maritime Organization (IMO) precondition the fact that the member states must adapt these international norms to local settings, thus protecting the maritime activities and environment.

The safety issue in ports is given first priority, bearing in mind its crucial role in the world supply chain. Barnes (2019) emphasises that regulations are not only related to the physical security of ships and the infrastructure, but also the health of port employees. This will include the usage of advanced navigational aids, efficient traffic management systems as well as best practices in cargo handling to minimise accidents. Moreover, the environmental footprint of port operations has come under a lot of scrutiny as Ellis and Martin (2021) contend. Ports are at a crossroad that has affected both marine and terrestrial ecology and stringent regulations are needed to control wastes, reduce emissions and avoid pollution cases. This ecological responsibility goes as far as fighting climate change by encouraging ports to be more green and invest in the global sustainability movement.

Ports are not separate phenomena in the larger socio-economic arena, they are part and parcel of the economy, and their presence and existence are affected and influenced by the surrounding community and market forces. According to Diaz and Clark (2020), regulatory frameworks guarantee reasonable competition, and ensure that monopolistic behaviour is avoided, promoting efficiency and innovation. This is important in ensuring that there is a balanced and fair global trading system where one party does not take over at the expense of others.

The process of adapting to these regulatory requirements is not without its problems. Nguyen (2019) notes that compliance comes at a great cost in terms of investments, which include technology, training, and the upgrading of infrastructure. In the case of ports in the developing countries, in particular, such demands may be overwhelming, which can become a significant setback in the process of achieving sustainability and operational excellence. Regardless of this, the contribution of regulatory and environmental frameworks in port operations cannot be ignored. In a world of a fast technological development and the impending risk of climate change, ports are becoming critical points of sustainable development as explained by Harris and Thompson (2022). These frameworks not only stipulate the terms of operations, but have a broader economic and environmental implication, making ports key players in the solution of the global issues of sustainability, safety and efficiency.

2.12 Global Trends in Container Shipping and Logistics

Over the past decades, container shipping and logistics industries have undergone massive changes, largely driven by the growth in the field of technology, the transformation in the landscape of the economy, and the varied requirements of the consumers. Since these sectors are the core of international trade, in-depth knowledge of the latest trends is of utmost importance to businesses, policymakers, and stakeholders (Smith and Anderson, 2020). The shift towards larger vessels is one of the greatest trends in the shipping industry. Because of economies of scale, shipping companies have been compelled to invest in mega-ships with a capacity of over 20,000 TEUs. Such ships are said to offer lower per-container prices, but they also create problems in the infrastructure of ports, with not all ports capable of serving such large-scale vessels (Chen and Williams, 2021).

Modern shipping and logistics activities have also been dominated by the element of digitalisation and the adoption of state-of-the-art technologies. The Internet of Things (IoT) devices enable real-time tracking, which enables the shipper and recipient to know the exact position and the state of goods that are being transported at any given time. This transparency will make supply chains more efficient, minimise losses, and improve supply chain reliability as a whole (Martinez and Rodriguez, 2020). In addition, there is increased focus on the sustainability in container shipping. The maritime industry is historically a major source of CO2 emissions to the global environment, and today the industry is seeking alternatives such as biofuels, electric propulsion and designing ships that are less energy-consuming. This

change is driven by regulatory factors as well as a wider recognition by society of the need to fight climate change (Turner and Jones, 2022).

Another trend that is transforming the world of container shipping is the use of automation. There are automated cranes, self-driving vehicles and sophisticated algorithms used in ports and terminals to process containers. This kind of automation is not only efficient in terms of operation but will also help in solving labour issues in most regions of the world (Liu and Carter, 2019). Finally, the presence of e-commerce, as well as the transformation of consumer expectations, has further burdened shipping and logistics businesses. The introduction of same-day or next-day delivery, track and trace and flexible shipping, are now more an industry standard than an exception. To provide this, logistics providers are turning to modern analytics, AI-based demand prediction, and decentralised warehouse systems to bring products nearer to consumers and meet orders with high speed (Kapoor and Singh, 2021).

Finally, the container shipping/logistics industries are dynamic, adjusting to the developments in technology, environmental needs and changing market requirements. With such industries shifting and changing gears, they still lead the world in terms of trade, with goods flowing in an effective and sustainable manner, across the continents and seas.

2.13 Economic and Social Impacts of Container Hub Port Development

Container hub ports are frequently framed in the literature as catalytic nodes that can reshape regional competitiveness by concentrating connectivity, logistics services and cargo consolidation, but scholars differ on whether hub status drives development or primarily reflects underlying trade and industrial strength. UNCTAD (2023) emphasises the enabling role of port performance and trade facilitation, arguing that ports that reduce delays and improve reliability can lower trade costs and strengthen participation in global value chains, especially in developing economies. In contrast, the Container Port Performance Index (CPPI) literature places stronger emphasis on measurable operational efficiency, indicating that ports compete for carrier calls through performance indicators such as vessel time in port and service reliability (World Bank and S&P Global, 2024). The practical implication of these differing perspectives is that hub port development is not a guaranteed pathway to growth; rather, economic benefits are conditional on performance improvements and system-wide logistics coordination. This is directly relevant to Durban Harbour because the port's hub ambition must

be supported by demonstrable improvements in productivity, capacity and corridor integration rather than being justified only by geographic position (UNCTAD, 2024; World Bank and S&P Global, 2024).

Economically, the development of a container hub port is commonly associated with increased trade volumes and improved connectivity through route centrality and transhipment functions. UNCTAD (2023) notes that port performance affects the reliability of trade flows, and that congestion and clearance delays raise trade costs and reduce export competitiveness. However, the literature is divided on causality: one view treats hub development as a driver of throughput growth through economies of scale and increased carrier frequency, while a more cautious view argues that throughput growth often precedes hub status because hub ports tend to emerge where trade demand and industrial systems are already strong (UNCTAD, 2024). The CPPI evidence strengthens the conditional view by suggesting that trade centrality alone is insufficient without operational efficiency, because global carriers allocate capacity to ports that offer predictable turnaround times and high service reliability (World Bank and S&P Global, 2024). For Durban Harbour, this implies that infrastructure expansion and performance reforms must be pursued together if trade volume growth is to be sustained and translated into broader economic gains (UNCTAD, 2023; World Bank and S&P Global, 2024).

A second economic impact relates to fiscal effects, including customs revenue, port tariffs and tax contributions that may increase when trade-linked activity expands. Yet, the literature cautions against assuming automatic fiscal gains, as outcomes depend on governance effectiveness, the structure of cargo flows and the degree to which port activity is linked to domestic value addition rather than transhipment-only movements. UNCTAD (2023) indicates that trade facilitation reforms and clearance efficiency are important in strengthening the predictability of trade systems, which can support formal trade performance and revenue-related outcomes. However, CPPI-focused studies do not claim that efficiency guarantees inclusive fiscal benefits; they primarily show that operational performance is a competitiveness requirement rather than a direct measure of national development impact (World Bank and S&P Global, 2024). This debate matters for Durban Harbour because investment justification should not rely only on revenue narratives, but also on whether performance gains are likely to attract and retain mainline services and improve national logistics competitiveness (UNCTAD, 2024).

Job creation is often presented as a major benefit of hub port development, yet this claim must be supported with evidence given automation trends in modern terminals. While ports create direct employment in terminal operations, marine services, security and administration, employment effects are increasingly shaped by technology, outsourcing patterns and logistics corridor development. In South Africa, where unemployment remains structurally high, broad claims about job creation require grounding in labour market evidence. Statistics South Africa (2025) reports an official unemployment rate of 31.4% in Q4 2025, indicating a constrained labour absorption environment in which port expansion alone cannot be assumed to reduce unemployment meaningfully without broader industrial and logistics-linked growth. Therefore, a more defensible position is that hub port performance improvements can support employment indirectly by strengthening trade reliability and enabling growth in port-linked sectors such as warehousing, distribution and export-oriented value chains, rather than implying that terminal expansion automatically produces large-scale employment (UNCTAD, 2023; Statistics South Africa, 2025).

Socially, container hub port development can contribute to urbanisation and infrastructure improvements through increased demand for housing, transport systems, public services and business development around port corridors. However, the literature also highlights potential negative externalities such as congestion, unequal spatial development and pressure on municipal services if growth is not accompanied by integrated planning. UNCTAD (2024) highlights that port performance and hinterland logistics integration matter for reducing congestion and improving reliability, which can moderate urban strain and support more balanced development outcomes. Similarly, CPPI evidence implies that when ports perform poorly and experience long vessel and cargo delays, congestion effects can intensify, increasing costs and public pressure in port cities (World Bank and S&P Global, 2024). For Durban Harbour, this suggests that the social benefits of hub development will depend not only on expanding infrastructure, but also on strengthening operational systems, corridor governance and inclusive urban planning aligned to port growth (UNCTAD, 2023; World Bank and S&P Global, 2024).

2.14 Case Studies: Successful Container Hub Ports

Examining successful container hub ports provides invaluable insights into best practices, strategies, and innovations that can be employed at other ports, such as Durban Harbour. This

section reviews some notable hub ports and distils the lessons Durban Harbour might glean from their successes.

Port of Singapore is renowned for its efficiency, advanced technologies, and strategic location at the crossroads of major shipping routes. This port's success can be attributed to its continuous investments in cutting-edge technologies, infrastructure, and the training of its workforce. An integrated logistics and supply chain management approach has further solidified its reputation (Chen and Lim, 2019).

Lesson for Durban: Emphasise continual investment in infrastructure and technology while fostering a well-trained workforce.

Port of Rotterdam, Netherlands: As Europe's largest port, Rotterdam has capitalised on its strategic location and robust hinterland connections. The port authorities have also implemented sustainable and eco-friendly practices, attracting international praise (De Vries and Van den Berg, 2020).

Lesson for Durban: Strengthen hinterland connections and focus on sustainability as a unique selling proposition.

Port of Shanghai, China: A key node in the global shipping network, the Port of Shanghai's success can be attributed to its vast scale, deepwater facilities, and integration into China's massive manufacturing and export machine. Additionally, government support and policies have played a role in its rapid expansion (Wang and Zhang, 2018).

Lesson for Durban: Establish strong governmental support and align port strategies with national trade and manufacturing ambitions.

Jebel Ali Port, Dubai: This port's success story revolves around its business-friendly policies, efficient operations, and its status as a free trade zone, enticing businesses to set up their operations nearby (Al-Khouri and Al-Mansoori, 2017).

Lesson for Durban: Consider incentives and policies that attract businesses to operate in or near the port, enhancing its importance in the trade ecosystem.

Port of Los Angeles/Port of Long Beach Port, USA: Located in California, these twin ports serve as a significant gateway for trade between Asia and North America. Their success is a testament to their excellent connectivity, both maritime and terrestrial, and their ability to handle vast quantities of cargo efficiently (Smith and Garcia, 2019).

Lesson for Durban: Emphasise seamless connectivity and efficient cargo handling as core attributes.

In conclusion, while each hub port's success has unique elements rooted in its geographical, political, and economic context, certain shared attributes emerge. By studying these cases, Durban Harbour can identify strategies to enhance its operations, cater to global trade demands, and ultimately position itself as a premier container hub port.

2.15 Chapter summary

The process of containerisation development and its relevance, the key characteristics of hub ports and the essential aspects that make them successful have been discussed throughout this literature review. The details of trade patterns, especially in the Southern Hemisphere, have been explored with a focus on the historical background and present status of Durban Harbour in relation to trade in Africa and in the world at large. Knowing the infrastructure requirements, operational issues, and approaches used by the major hub ports, Durban Harbour will be able to learn valuable lessons concerning its development. The importance of strategic geographical positioning, regulatory and the environmental frameworks that govern port operations cannot be over-emphasised. In addition, it is essential to follow world trends in container shipping and logistics, not only to be competitive, but also to guarantee sustainable development. The consequences of container hub port growth in economic and social terms bring into focus a wider range of advantages that extend beyond trade to include development of jobs and socio-economic improvement. Based on the case studies of successful port containers hubs, Durban Harbour is able to absorb the lessons and best practices for its development pathway. Essentially, the literature highlights how complex the operations of hub ports and their development are, and Durban Harbour needs to be holistic, informed and visionary in its activities to ensure that it rises to the next level of its operations in the world arena.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

Methodology used in any type of research is one of the factors that significantly affects its effectiveness (Creswell, 2014). This chapter offers a critical analysis of the qualitative approaches, which are used to discuss the possibility of developing Durban Harbour into a container hub port in the Southern Hemisphere. This approach was selected to uncover the operational issues, infrastructure obstacles, and strategic prospects within the port based on the insights of the people involved. The chapter provides the philosophical basis of the study, research design, data collection and analysis methods, and possible methodological limitations. Also, this part clarifies the steps to be followed in the fieldwork, the philosophical view of the study in relation to the qualitative research and actions taken to select participants and uphold the ethics.

3.2 Research Questions

This research project encompasses five broader research questions that seek to guide the study. The research questions are illustrated below.

i. Is the geographical location of Durban Harbour advantageous for its development as a hub port for the Southern Hemisphere, and what role does its location play in influencing trade patterns in the region?

ii. What are the existing barriers and challenges preventing Durban Harbour from becoming a hub port in the Southern Hemisphere, and how do factors such as investment, expansion potentials, shipping demand, efficiency, political climate, and trade blocks impact the position of the port as hub port?

iii. What measures need to be taken to ensure the development of Durban Harbour as a hub port, in terms of infrastructure enhancement, operational efficiency improvement, and attraction of shipping lines and logistics service providers?

iv. What is the significance and potential economic impact of Durban Harbour becoming a hub port for the Southern Hemisphere, and how would this benefit regional and international trade?

3.3 Research Objectives

The research objectives were formulated in harmony with the research questions and research aims. Below are five research objectives.

i. To assess the geographic suitability of Durban Harbour for the role of a hub port in the Southern Hemisphere and to analyse its influence on regional trade patterns.

ii. To identify the current barriers and challenges inhibiting Durban Harbour's potential as a hub port and examine the impact of factors such as investment, expansion potential, shipping demand, efficiency, political climate, and trade blocks.

iii. To propose measures for developing Durban Harbour as a hub port, focusing on improving infrastructure and operational efficiency, and the attraction of shipping lines and logistics service providers.

iv. To evaluate the potential economic impact and significance of Durban Harbour becoming a hub port in the Southern Hemisphere and to examine how this transformation would contribute to regional and international trade.

3.4 Research Paradigm

This research is based on an interpretivist research paradigm, which is an appropriate type of research paradigm to explain the subjective experiences, views, and multifaceted realities of the stakeholders in Durban Harbour. This is in contrast to the pragmatic paradigm, which uses the qualitative approach, while the interpretivist relies solely on qualitative approaches to explore the subtle perceptions and meanings that individuals attach to their experiences (Denzin and Lincoln, 2011).

The reality in an interpretivist research is perceived as fluid and socially created, which is construed by different people in different situations. In this study, this paradigm is critical

because it enables one to gain profound insight into the intricate social processes and the behaviour of humans that determine the potential of Durban Harbour as a container hub port. It recognises that the truth is not objective and unique but is constructed in the course of interactions and interpretations of the involved people (Creswell, 2014).

Through this method, the study will be able to embody the subtle views of stakeholders such as the port authority, the executives of shipping companies, and the logistics specialists whose opinions are vital in getting a clear picture of the challenges, the strategic opportunities and the infrastructure obstacles that are inherent in the development of the port.

This qualitative research methodology of the study is based on the interpretivist paradigm. It will inform the choice of the data collection strategy such as the in-depth interviews and will ensure that such interactions yield rich and detailed data. This will allow the researcher to explore the thoughts and behaviours of the participants in a deeper manner as they will provide an in-depth analysis of the perspectives of the participants.

Furthermore, this paradigm stresses the significance of the context wherein data is gathered, and it argues that there should be an approach that is sensitive to the environment and situations in which Durban Harbour is situated. It encourages the realisation of the way in which the perspectives of these stakeholders are informed by their experience, backgrounds, and the general socio-economic environment.

Overall, the interpretivist paradigm supplements the richness of the qualitative analysis with the attention paid to the complexity and multidimensionality of human behaviour and social relationships in the operations and development of the port. This concentration makes sure that the research report is comprehensive and contextually based and has substantive information that is practical and relevant to policy-making and strategic planning of Durban Harbour.

3.5 Population, Sampling and Sample Size

3.5.1 Population

In qualitative research, the term "population" refers to the group of individuals or entities that are of interest in the context of the study’s objectives. Unlike in quantitative research, where the population usually represents a large group from which a statistically representative sample

is drawn, in qualitative studies, the population is often more specific and defined by the depth and richness of information it can provide (Fowler, 2013).

For this study on Durban Harbour, the population comprises a carefully selected array of stakeholders who have a direct or indirect connection to the port's operations and development. This group includes port authority officials, executives from shipping companies, logistics service providers, policymakers, industry experts, and representatives of the local community. Each stakeholder group offers unique insights into various aspects of the port's functioning and development, such as operational efficiency, strategic positioning, and socio-economic impacts.

The choice of such a diverse and relevant population is crucial for a qualitative inquiry aimed at gaining a nuanced understanding of the complex dynamics influencing the development of Durban Harbour as a container hub port. By engaging with a range of perspectives, the study seeks to capture a comprehensive view of the factors that shape the port's operations and its role in the regional and global maritime landscape. This approach aligns with Lavrakas (2008), who emphasises the importance of a holistic exploration of the factors influencing a subject of study, allowing for the generation of rich, actionable insights that can inform policy and strategic decision-making. This qualitative perspective ensures that the research delves deeply into the lived experiences and opinions of those most closely connected with Durban Harbour, thus providing an authentic, grounded understanding of the port's current challenges and potential for future development.

3.5.2 Target Population

In qualitative studies, the target population is a small and precise part of overall population that is directly connected with the research goals. The choice of this group is predetermined by the features that will address the objectives of the research since this is the area where the researcher is likely to discover the most topical and informative information (Fowler, 2013). The target population is not selected to represent statistically but rather to provide in-depth and rich data that is vital in the qualitative analysis.

In this research on the Durban Harbour, the population of interest is high-level decision-makers and professionals who have a strong influence and comprehensive understanding of the

operation, infrastructural and strategic dynamics of the port. These are the senior port authority officials, executives of leading shipping companies, logistics specialists, policy makers and industry analysts. The targeted group will help in ensuring that the research will capture firsthand information on the ground that is expert in developing informed insights and overall recommendations on the improvement of Durban Harbour as a container hub port. These stakeholders have in-depth knowledge and experience that would be invaluable in the deep appreciation of the operational issues, infrastructure requirements and strategic potentials at Durban Harbour.

Through interaction with this target population, the study will seek to identify subtle views on how Durban Harbour can develop and change in response to the present and future maritime requirements. This method is specifically appropriate to a qualitative study, in which the focus is on the nature and content of response, and the responses are not quantified.

3.5.4 Sampling Methodology

Sampling methodology is the controlled process whereby a researcher selects a smaller number of individuals, items, or cases from a larger population to study the characteristics of that population. The type of sampling selected plays a key role in the validity of research results since it determines the ability of the sample to capture the overall population from which it was drawn (Black et al., 2022).

Sampling methods can be classified into two broad categories, namely probability sampling and non-probability sampling. In probability sampling, selection is conducted randomly, with all members of the population having an equal opportunity of being selected. This approach allows the generalisation of research results to a broader population and encompasses techniques such as simple random sampling, stratified sampling, cluster sampling, and systematic sampling. Quantitative research is generally applied to inferential statistical conclusions regarding a population through the use of probability sampling (Fowler, 2013).

On the other hand, non-probability sampling uses non-random selection, where recruitment is conducted according to specific criteria or the judgement of the researcher, for example convenience, purposive, expertise-based, or snowball sampling. The most commonly used non-probability sampling techniques are purposive sampling, convenience sampling, snowball sampling, and quota sampling. This method is commonly employed in qualitative studies in

which the objective is to gain a deeper understanding of complex phenomena rather than to generalise findings to the entire population (Palinkas et al., 2015).

This qualitative study on Durban Harbour adopted purposive sampling. The purposive sampling approach is especially suitable when research focuses on the exploration of specific phenomena within a particular industry context. In this approach, participants are deliberately selected based on their knowledge, professional experience, and involvement in the subject under investigation, because they are able to provide rich, relevant, and informed perspectives on the research topic. In this study, stakeholder groups representing senior officials within port authorities, executives from shipping companies, logistics specialists, and policymakers were selected because they possess expert knowledge regarding port operations, infrastructure development, regulatory frameworks, and strategic planning associated with the development of Durban Harbour as a container hub port.

The selection criteria for participants were based on several considerations to ensure relevance and representativeness of the broader port ecosystem. Firstly, participants were required to have direct professional involvement in maritime operations, port management, logistics coordination, or policy development related to port infrastructure. Secondly, individuals occupying senior or decision-making positions were prioritised because they possess strategic insights into operational challenges and investment requirements. Thirdly, stakeholders were selected across multiple sectors of the maritime value chain to capture diverse perspectives, including operational, regulatory, commercial, and strategic viewpoints. This approach ensured that the sample reflected the interconnected nature of port development systems rather than representing a single organisational perspective.

Although purposive sampling does not aim for statistical representativeness, the inclusion of participants from multiple stakeholder categories enhances the credibility and transferability of findings by providing a comprehensive understanding of the phenomenon under investigation. In qualitative research, representativeness is achieved through depth of expertise and relevance of participant experience rather than numerical representation. Therefore, the selected participants were considered appropriate to provide meaningful insights into the opportunities and constraints influencing the development of Durban Harbour as a container hub port.

While purposive sampling can generate rich and nuanced data that is highly relevant to the research objectives, it is important to acknowledge that findings may have limited

generalisability beyond the specific context studied. This limitation is inherent in qualitative research, where the emphasis is placed on depth of understanding rather than broad population inference (Etikan, Musa and Alkassim, 2016). Nevertheless, the methodological choice supports an in-depth exploration of the complex dynamics influencing Durban Harbour development and remains consistent with the overall research strategy and objectives of the study.

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3.6 Data Collection

Data collection in the context of qualitative research is an important process because researchers collect in-depth information that is pertinent to the objectives, as well as questions of their study in a systematic manner. Creswell and Creswell (2022) present a number of various methods to collect qualitative data, including interviews, observations, reviewing documents, among other methods, and each of them is selected depending on the extent of information it could bring to the study of phenomena.

In this qualitative research on the potential of Durban Harbour as a container hub port, semi-structured interviews were used in data collection since they are especially good for delving into the intricacy of a problem. The 8 interview participants interviewed were selected to facilitate a holistic view of the various aspects of port operations and port development. The population of the participants in the research study had a wide range of positions including Senior Port Authority Officials, Leaders of Major Shipping Companies, Logistics Experts, Policy Formulators, Industry Analysts, and Academic Experts.

Development of Interview Guide: An interview guide was thoroughly prepared with a set of open ended questions, which are in line with the research objectives. The questions were formulated to allow the participants to give detailed answers on how they felt about the infrastructure of Durban Harbour, the operational challenges and the opportunities as far as development is concerned.

Conducting Interviews: Interviews were conducted with a purposively selected group of stakeholders, the choice of semi-structured interviews allows for a flexible yet focused

conversation, where participants can express their views and experiences while still addressing the key themes of the research.

Modes of Interviewing: To accommodate participants' preferences and logistical constraints, interviews were conducted using various modes, namely face-to-face, telephone, or video conferencing. Each interview was scheduled to last approximately one hour to ensure thorough discussion.

Data Recording and Transcription: With the consent of the participants, each interview was audio-recorded. This ensured that no details were lost and that the data could be accurately analysed later. The recordings were then transcribed verbatim, providing a detailed and precise record of the discussions.

Data Storage and Management: All transcripts and recordings were stored securely, with access limited to the research team. This was to ensure confidentiality and compliance with data protection regulations. Transcripts were managed and organised to facilitate easy access and analysis during the coding and thematic analysis stages.

Ethical Considerations: Participants were informed about the purpose of the study, their rights as participants, including the right to withdraw at any time without consequence, and the measures taken to ensure their privacy and the confidentiality of the information they provided.

By focusing exclusively on qualitative data collection, this study was able to gain a rich, nuanced understanding of the challenges and opportunities at Durban Harbour. This method allowed for an in-depth exploration of the stakeholders' perspectives, providing valuable insights that are essential for understanding the operational and strategic complexities of developing Durban Harbour as a leading container hub.

3.7 Data Analysis

Given the qualitative nature of this research on the development potential of Durban Harbour as a container hub port for the Southern Hemisphere, data analysis was conducted using thematic analysis, a method well-suited for identifying and examining patterns within

qualitative data. This approach allows for a deep understanding of the operational challenges and strategic opportunities at the port.

3.7.1 Thematic Analysis Process

Data Familiarisation: The first step involved thoroughly reading and re-reading the interview transcripts to become familiar with the depth and breadth of the content. This stage was essential for identifying initial ideas, patterns, and recurrent meanings across the data. During familiarisation, preliminary notes were made to capture key points, emerging patterns, and early interpretations that appeared relevant to the research questions and objectives. This ensured that the researcher developed an overall understanding of participant perspectives before moving to formal coding.

Coding: The data were meticulously coded, with codes assigned to specific pieces of information relevant to the research questions. Coding was both deductive and inductive. Deductive coding began with predefined codes aligned to the interview guide and research objectives, ensuring that the analysis remained connected to the study's focus areas. Inductive coding was used to allow new codes to emerge from participant responses, especially where participants introduced ideas not anticipated in the interview guide. The coding process was iterative, meaning that codes were refined, merged, expanded, or renamed as the researcher revisited the transcripts to ensure consistency and accuracy across the dataset.

Theme Development: After coding, the various codes were grouped into potential themes. These themes were carefully refined and defined to ensure they accurately represented the data segments they were derived from. This stage involved a continuous iterative process of checking and rechecking the relationship between coded extracts and potential themes to ensure that the themes were robust, coherent, and directly supported by participant evidence. The researcher also considered whether themes were sufficiently distinct from one another and whether the grouping of codes reflected meaningful patterns across participant responses.

Reviewing Themes: Each theme was reviewed in the context of the entire dataset to ensure it had a strong and coherent story about the coded extracts and the full dataset. This review process ensured that themes were internally consistent and externally distinct, meaning that the data within a theme fitted together logically while themes remained clearly different from each other. Where weaknesses were identified, themes were adjusted by splitting, combining, or

redefining them to strengthen the overall analytical narrative and to ensure alignment with the research questions.

Defining and Naming Themes: Final themes were defined and named, providing a clear, informative label for each theme that reflected the essence of what was captured in the data. This phase involved synthesising the central meaning of each theme into a concise descriptive title. Detailed theme definitions were developed to clarify the scope of each theme, the key ideas captured, and how the theme related to the broader research problem regarding Durban Harbour's development potential as a hub port.

Validation Procedures and Triangulation: To ensure credibility and reliability of the thematic findings, validation procedures were applied throughout the analysis process. Firstly, consistency checks were performed by repeatedly comparing themes and coded extracts against the original transcripts to ensure that interpretations remained grounded in participant responses. Secondly, triangulation was applied by analysing responses from different stakeholder groups within the port ecosystem, including port authority officials, shipping industry participants, logistics specialists and policy-related stakeholders. This enabled the researcher to compare perspectives across stakeholder categories and identify converging and diverging viewpoints on infrastructure, operational constraints, and investment needs. Thirdly, an audit trail was maintained by documenting coding decisions, theme refinements, and analytical reflections to ensure transparency in how interpretations were reached. These procedures strengthened the trustworthiness of the analysis and ensured that the themes were supported by credible and verifiable evidence from the dataset.

Writing and Analysis: In the final phase, the themes were analysed to narrate the story of the data, linking back to the research questions and the literature reviewed in earlier chapters. This analysis interpreted the meaning of themes in relation to the study objectives, explaining how participant perspectives reinforced, extended, or challenged existing literature on hub port development and port competitiveness. The findings were presented in a structured manner, supported by participant quotations, and interpreted to provide insights into how the data contributed to understanding the development potential of Durban Harbour as a hub port.

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3.7.2 Validation of Data

To ensure the reliability and validity of the analysis, several strategies were employed:

Member Checking: Drafts of the findings were returned to participants, allowing them to confirm the accuracy of the representation of their views.

Expert Validation: Feedback was sought from experts in maritime studies and qualitative research to ensure the analysis was methodologically sound and the interpretations were credible.

Reflexivity: The researcher maintained a reflexive journal throughout the analysis to document the decision-making process and reflect on how their own biases and assumptions might influence the analysis.

This rigorous approach to qualitative data analysis ensured that the study produced a comprehensive understanding of Durban Harbour's complex dynamics, providing actionable insights for its development as a major container hub in the Southern Hemisphere.

3.8 Validity and Reliability

In qualitative research, the concepts of validity and reliability are often encompassed by the broader term "trustworthiness," which refers to the accuracy, authenticity, and truthfulness of the findings. Trustworthiness is crucial to affirm that the research methods, techniques, and results genuinely reflect the phenomenon under investigation. This involves ensuring that the study accurately represents the realities it aims to capture and that the findings are consistent and reproducible over time (Golafshani, 2003).

In this study, several strategies are employed to enhance the trustworthiness of the findings, below are some that were considered.

Triangulation: While traditionally used in mixed-methods approaches, triangulation can also be applied within qualitative frameworks by using multiple data collection methods (e.g., interviews, observations, document reviews) to gather data. This allows for cross-validation and helps ensure the findings are robust and comprehensive (Carter et al, 2014).

Purposive Sampling: The purposive sampling technique ensures the selection of participants with knowledge or experience relevant to Durban Harbour's development as a container hub. This targeted approach enhances the depth and relevance of the data collected, directly supporting the research questions (Palinkas et al., 2015).

*Member Checking***:** This involves sharing the findings or interpretations with the participants, allowing them to confirm the accuracy of the data and the researcher's interpretation. This process adds credibility and depth to the qualitative data, ensuring that the findings genuinely reflect the participants' perspectives and experiences (Harper and Cole, 2012).

Thick Description: Detailed descriptions of the research context and the participants' backgrounds allow readers to determine how transferable the findings are to other contexts. This depth of description enhances the external validity of the study.

Reflexivity: The researcher actively reflects on their own biases, preferences, and influences throughout the research process. Documenting these reflections helps to clarify how the researcher's perspectives may have shaped the data collection and analysis, thereby increasing the transparency and integrity of the study.

Audit Trail: Keeping detailed records of the data collection process, data analysis methods, and decision-making throughout the research enhances transparency and allows other researchers to trace the conclusions reached back to the original data. This detailed documentation supports the study's replicability, thereby enhancing its reliability (Yin, 2014).

By implementing these strategies, the study aims to provide trustworthy findings, offering meaningful and authentic insights into the development potential of Durban Harbour as a container hub port for the Southern Hemisphere.

3.9 Ethical Consideration

Ethical considerations are fundamental to ensuring a research study's integrity, credibility, and ethical soundness. In this study focusing on the development potential of Durban Harbour as a container hub port for the Southern Hemisphere, several vital ethical principles are adhered to:

Informed Consent: Participants are provided with clear, comprehensive information about the study's purpose, methods, potential risks, and benefits. They are informed that their participation is voluntary and that they can withdraw without any consequences. Consent is obtained in writing before any data collection begins, ensuring that participants are willing and fully informed about their involvement in the study (Resnik, 2011).

Confidentiality: Measures are taken to protect the identity and privacy of the participants. Personal information is kept confidential, and data is reported in a way that individual participants cannot be identified. Sensitive data is securely stored and is only accessible to the research team, safeguarding participants' privacy and adhering to data protection laws and guidelines (Flick, 2009).

Transparency and Honesty: The research is conducted with transparency and honesty. Findings are reported accurately, without fabrication or falsification of data. Any limitations or potential biases of the study are openly acknowledged, ensuring that the research is conducted with integrity and that the results are trustworthy (Israel and Hay, 2006).

Avoidance of Harm: The researcher takes all possible steps to minimise any potential harm to participants. This includes ensuring that the data collection methods are non-invasive and that any potential risks or discomfort are communicated to the participants beforehand (Sieber, 2012).

Debriefing: After data collection, participants are offered a debriefing session where they can ask questions and receive additional information about the study. This ensures that participants are fully aware of their contribution and the study's outcomes, and it provides an opportunity to address any concerns they might have (Fontes and Gale, 2018).

By adhering to these ethical principles, the study respects the rights, privacy, and welfare of the participants, ensuring that the research is conducted in a manner that is both ethically sound and socially responsible.

3.10 Research Limitations

The research on Durban Harbour's development potential as a container hub port, while rigorous and comprehensive, encounters several methodological limitations that could impact the interpretation and generalizability of its findings:

3.10.1 Methodological Limitations:

Sample Selection Bias: Utilising purposive sampling introduces selection bias since participant selection is based on the researcher's judgment. This may mean that the perspectives and insights gained do not fully represent the broader population, thereby limiting the findings' generalisability.

Subjectivity in Data Analysis: The inherent subjectivity in thematic analysis could introduce biases in theme identification and development. Despite efforts to ensure intercoder reliability, such as involving multiple researchers in the coding process, the subjective nature of qualitative analysis remains a limitation.

Limited Generalisability: The findings from Durban Harbour may not be fully applicable to other container hub ports due to unique operational dynamics, geographical location, and other specific characteristics.

3.10.2 Time Constraints

The need to complete the research within a limited timeframe may restrict the depth and scope of the study. Time limitations can hinder the possibility of gathering data from a broader sample.

3.10.3 Sample Size Limitation

The relatively small sample size, particularly in qualitative research, can limit the breadth of perspectives and insights. This may affect the robustness of the conclusions drawn.

3.10.4 Resource Constraints

Financial and logistical constraints can limit the scale of data collection, particularly in accessing a wider range of participants or conducting field research.

3.10.5 Topic Constraints:

The specific focus on Durban Harbour's development potential may not encompass broader industry trends or external factors influencing global port operations. Acknowledging these

limitations was crucial for a balanced interpretation of the research findings. While these constraints may impact the study's scope, efforts were made to mitigate their effects and ensure the research provides valuable insights and recommendations for the development of Durban Harbour as a container hub port. Transparent reporting of these limitations also supported the validity of the research and contributed meaningfully to the field.

3.11 Chapter Summary

To sum up, the study on the potential development of the Durban Harbour as a container hub port in the Southern Hemisphere has a great value and potential. The research design uses a qualitative design where the key stakeholders were interviewed to gather exhaustive information about the infrastructure and operational challenges. Thematic analysis has been used as the main method of data analysis to establish patterns, themes and crucial discoveries in the qualitative data. Nevertheless, one should mention several research method limitations that can affect the results of the research. These include the possible sample selection bias, the subjectivity of data analysis, the scarcity of quantitative data, time limitations, and the insufficient generalisability. These are the limitations, which are to be taken into consideration when interpreting the research results. In spite of the constraints, the study will offer useful information on how Durban Harbour should be developed as a container hub port. The results will be part of the knowledge of the infrastructure and operational issues experienced by the port and offer improvements strategies. The limitation to the transparency of reporting and the critical interpretation of the findings strengthened the validity and gave the research a basis of how to conduct further studies on this topic.

CHAPTER 4: PRESENTATION OF ANALYSIS AND FINDINGS

4.1 Introduction

The following chapter is devoted to the analysis and results of the data obtained due to the interviews held with a variety of stakeholders that are involved or concerned with the operations and development of Durban Harbour. The chapter will explore the views, experiences, and perceptions of these stakeholders with regard to the possible metamorphosis of Durban Harbour into a large container port in the Southern Hemisphere. The research questions as listed in the preceding chapters will inform this exploration include to measure the current status of Durban Harbour, the factors that discourage its development as a hub port, to identify what actions are needed to propel its development, and how it will affect the economy and benefit the regional and global trade.

The thematic analysis approach is used as the methodology to analyse the data about the interviews. The reason why this method has been selected is because it is flexible and most effective in detecting, analysing and reporting patterns (themes) within the data. It was started with a careful transcription of the interviews, then the detailed reading of the input to obtain the profound familiarity with the content. Preliminary codes were developed by highlighting important aspects of data that were pertinent to the research questions. These codes were then summarised into possible themes, which caught something significant of the data with reference to the research questions and represented some degree of patterned response or meaning in the data.

Thereafter, themes were examined and narrowed down to reflect the dataset well. This entailed a back and forth action among the dataset, coded extracts and the themes set in order to be coherent. These themes which were identified during the analysis give the outlines of presenting and discussing the results of this chapter. All the themes are backed up with direct quotes of what is said in the interviews, which provides a detailed, rich, and nuanced insight into how the stakeholders perceive the development of Durban Harbour as a container hub port. This thematic method makes it possible to have a qualitative presentation that provides a holistic understanding of the complexities of port development. It enables one to present a balanced story in terms of the complexity of the experience of stakeholders and the challenges of Durban Harbour, and to consider strategies of its future. In such a methodological procedure, this chapter seeks to make important contributions to the empirical field of the study of the

maritime issues and offer practical suggestions to the policymakers, port authorities, and other industry stakeholders engaged in the current establishment of Durban Harbour.

4.2 Methodology Recap

4.2.1 Study Aim

This research aims to delineate a clear, comparative, and data-driven justification for transforming Durban Harbour from a gateway to a hub port. The aim is to assess the feasibility and the developmental opportunities for enhancing Durban Harbour's container handling capacity, infrastructure, and operational efficiency improvement towards positioning the port as a hub port for the Southern Hemisphere, leveraging the economic benefits of becoming a hub port. This transformation is not merely a matter of local or regional interest, but is pivotal in the broader international trade and commerce scheme.

4.2.2 Research Objectives

The research objectives were formulated in harmony with the research questions and aims. Below are the five research objectives.

i. To assess the position of the Durban Harbour port on the major trade routes in the Southern Hemisphere, and to analyse its influence on regional trade patterns.
ii. Identify the inhibitors and assess the levels of investment, expansion potential, shipping demand, political climate, and trade blocks.
iii. To make proposals for developing Durban Harbour as a hub port, focusing on improving infrastructure, operational efficiency, and attraction of shipping lines and logistics service providers.
iv. To examine the economic impact of the Durban Harbour port and its impact on the region, and to examine how this transformation would contribute to regional and international trade.

This research adopted a qualitative approach, with a significant emphasis on qualitative data collected through semi-structured interviews. This section recapitulates the methodology applied for the interview process and the thematic analysis, providing a clear understanding of how the data was collected, analysed, and synthesised to address the research objectives.

4.2.3 Interview Process

The study entailed undertaking semi-structured interviews with a carefully chosen sample of individuals who have either a direct or indirect interest in the activities and growth of Durban Harbour. The interviewees were 8 high ranking port authority officials, executives of big shipping companies, logistics specialists, policy makers, and industry analysts. Using the purposive sampling method of selection ensured that the respondents would be knowledgeable, experienced, and would have insight into the subject of the research, namely Durban Harbour as a potential container hub port.

The guides used in each interview addressed the research objectives of the study based on themes concerning the study. The semi-structured interviews however provided flexibility so that the respondents could provide information and experience that was not contained in the set questions, thereby providing a richer data than that which was contained in the set questions. Prior to the interviews, the subjects were advised on the purpose of the study and the confidentiality of their responses. To verify the accuracy of the data capture and data analysis, consent to record the interviews was taken. The interviews were to be conducted when and in whichever form (in-person, phone or video conferencing) was convenient to the participants, which showed that the interviewer respected their time and choices.

4.3 Demographic Information

The demographic information of the participants provides an insight into the various views that were taken in this research. The interviewees were then chosen specifically because of their participation in Durban Harbour and their knowledge in different areas concerning maritime trade and port operations. Enough participants (8) were interviewed to give a comprehensive insight on the various aspects of port operations and port development.

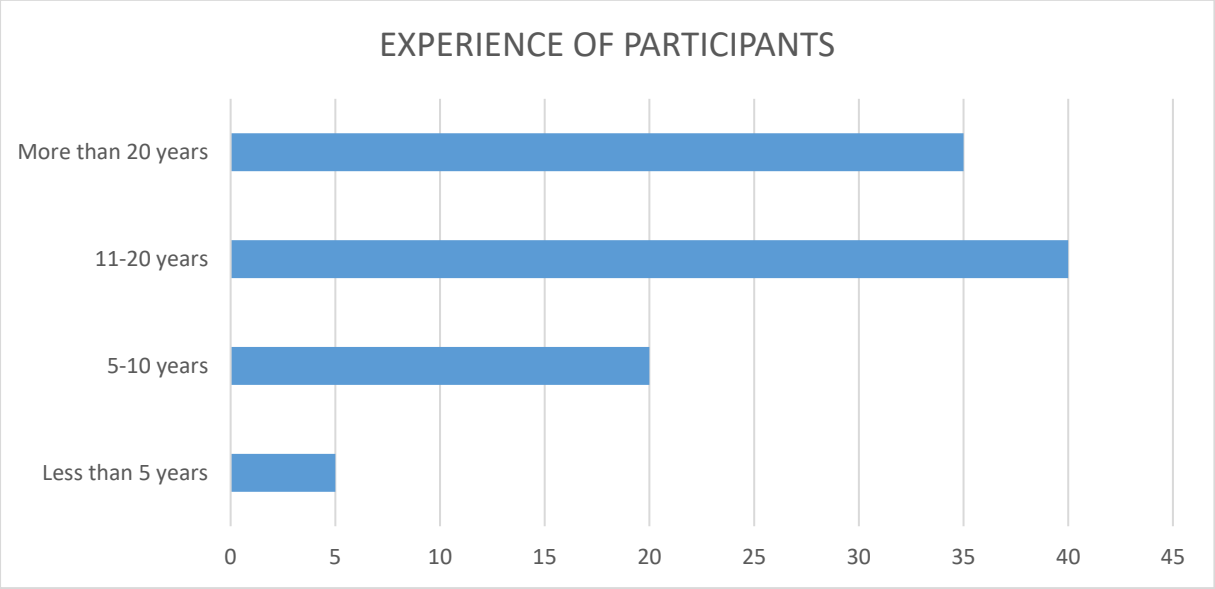
The study included a wide range of positions of the participants such as Senior Port Authority Officials, Executives of the Major Shipping Companies, Logistics Experts, Policy Formulators, Industry Analysts, and Academic Experts. The equitable representation of both the operational aspect of port management, as well as the strategic, analytical, and policy-making aspect, gives a versatile picture of the challenges, opportunities and strategic thoughts that are involved in the development of a port. The participants included senior port officials and shipping executives and provides a practical, on-the-ground, insight into the challenges and operational insights of the port that are important to determine what it is able and unable to do today. The

logistics professionals give a more detailed picture of the supply chain dynamics and infrastructure requirements, and the policymakers and industry analysts provide their ideas of the regulatory, economic, and competitive environments that influence the port activity. Conversely, academic scholars provide richness to theoretical aspects and the comparative research that bring Durban Harbour to a broader context of the scholarly maritime and logistic research. Such variety of the roles of the participants ensures that the findings have both practical experience and academic rigour as they provide a comprehensive analysis of the development prospects of the Durban Harbour as a hub in the Southern Hemisphere. The different insights taken in totality formulate a strategic roadmap on how to improve the capacity, efficiency, and contribution of the port to the global trade network with great implications to the policymakers, port authorities, and industry players in the current development and optimisation of Durban Harbour.

4.3.1 Years of Experience

The graph below provides a visual representation of the number of years of experience of the study participants. This diversity in experience enriches the analysis by incorporating insights from seasoned experts and emerging professionals in maritime logistics and port management.

Figure 4-1: Years of Experience of Participants



Source: Authors own compilation

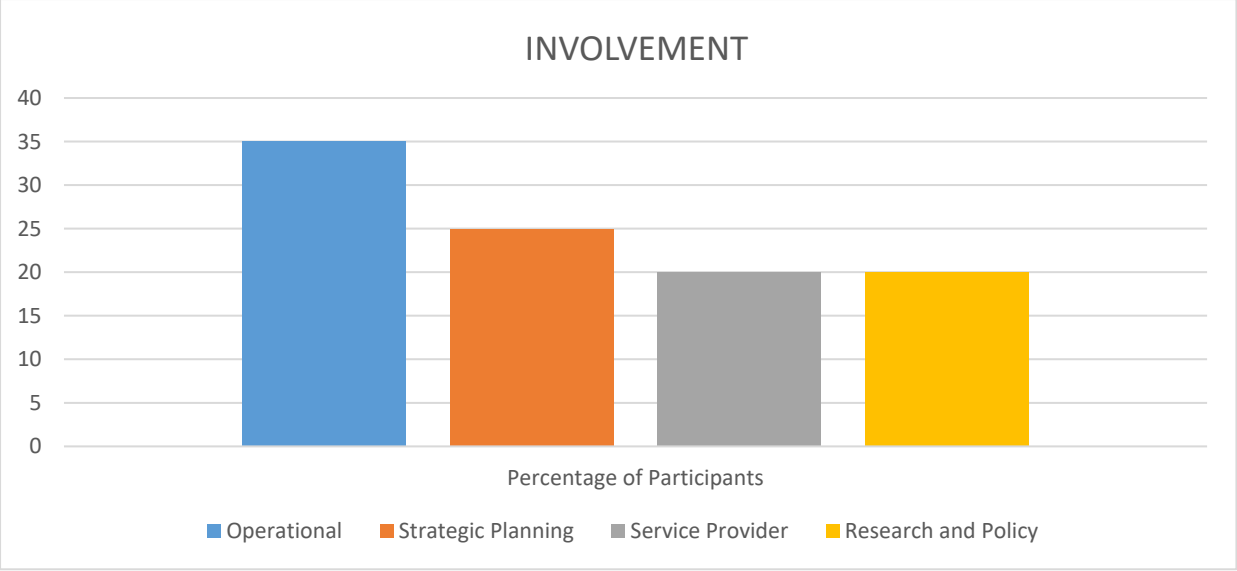
The distribution of participants' experience levels, with a spectrum ranging from less than 5 years (5%) to more than 20 years (35%) and an average experience of 15 years, significantly enriches the depth and relevance of the findings regarding Durban Harbour's transformation

into a major container hub. This variance in experience ensures a comprehensive view that captures both the historical evolution and the current trends within maritime logistics and port management. Participants with over two decades of experience bring invaluable historical insights and a long-term perspective on the industry's evolution, regulatory changes, and the strategic shifts in global trade patterns that have influenced Durban Harbour's development. Those in the mid-range category of 11-20 years (40%) contribute a blend of experience and adaptation to technological advancements and modern strategic challenges facing maritime logistics, offering a bridge between traditional practices and contemporary innovations. The younger cohort, with 5-10 years (20%) and those with less than 5 years (5%) of experience, injects fresh perspectives, agility, and a keen sense of emerging trends, such as digitalisation, sustainability, and the growing emphasis on supply chain resilience, which are crucial for reimagining Durban Harbour's role in the global trade ecosystem. This diverse tapestry of experience underpins a multifaceted understanding of the opportunities and challenges in developing Durban Harbour, highlighting the need for strategic investments in infrastructure, technology, and human capital to capitalise on its geographical advantages. The aggregate of these perspectives provides a well-rounded analysis that reflects on past and present scenarios and strategically forecasts into Durban Harbour's future, ensuring the findings are robust, relevant, and equipped to inform actionable strategies for stakeholders.

4.3.2 Involvement with Durban Harbour

To better understand the breadth of perspectives gathered in this study, we analysed the diverse roles of the participants regarding their involvement with Durban Harbour. The graph below illustrates this distribution, highlighting the varied responsibilities from operational duties to strategic planning and policy formulation.

Figure 4-2: Participants' Involvement with Durban Harbour



Source: Authors own compilation

The diverse involvement of participants in this study for the Durban Harbour covers a range of functionalities ranging from Operational (35%), Strategic Planning (25%), Service Provider (20%), Research and Policy (20%), lending this study a robust finding, and a holistic view of the port's ecosystem as well as greater potential for development into a significant container hub. This distribution provides a thorough, multi-faceted analysis by incorporating views from individuals deeply involved in the day-to-day operations of the port, forward-thinking leaders shaping its future, service providers improving its operational effectiveness, and researchers and policymakers who frame its role within wider economic and environmental, and regulatory contexts. Operational stakeholders offer an on-the-ground perspective of the port's immediate challenges and operational efficiencies. Strategic planners offer insights into long-term goals and paths for development, which are crucial for adapting the port to changing global trade patterns. Service providers discuss the logistical and infrastructural requirements essential for boosting the port's competitiveness and appeal to international shipping firms.

Meanwhile, researchers and policymakers provide a deeper understanding of the impact of regulatory frameworks, sustainability practices, and innovations in managing the port. Collectively, these diverse viewpoints ensure that the study's conclusions are comprehensive and practically rooted in the real-world dynamics of port operations, strategic growth, and the broader socio-economic and policy environments influencing maritime commerce. This holistic approach highlights the complexities of transforming Durban Harbour and delivers practical recommendations informed by a broad range of stakeholder experiences and

expertise, making the advice useful for both immediate enhancements and strategic long-term planning. The wide variety of participant demographics enriches the data set, offering numerous insights into the current conditions, challenges, opportunities, and development prospects of Durban Harbour as a leading container port. The diversity in backgrounds, industries, experience levels, and operational areas among the contributors greatly enhances the depth and scope of the study's findings and analyses.

4.4 Results and Discussion

The analysis and findings from the fieldwork examine Durban Harbour's potential evolution into a major container hub port for the Southern Hemisphere revealing several key themes across four primary objectives. A wide range of themes emerged from the interviews as covering the entire study, these themes range from location advantage, location impact, port competitive advantage, Infrastructure needs, capacity creation, investment requirement, investment challenges, regulatory and bureaucratic hurdles, operational efficiencies, strategies for attracting business, ease of doing business, economic growth, social welfare, impact of international trade, sustainability and environmental considerations, technological advancements, digitalisation, stakeholder collaboration and partnerships, community impact and social responsibility.

4.4.1 Assess Durban Harbour’s Position on Major Trade Routes

The approach involved a thematic analysis of insights gathered from interviews with various stakeholders, including senior port authority officials, executives from major shipping companies, logistics experts, policy formulators, and industry analysts, to assess Durban Harbour's position on major trade routes. This comprehensive collection of perspectives illuminated the strategic geographical advantage of Durban Harbour, emphasising its pivotal role due to its unique positioning on the eastern coast of South Africa, which offers unparalleled access to both the Indian and Atlantic Oceans. This strategic location facilitates the port's critical role in connecting the East and West, enhancing its potential as a major container hub. The analysis also delved into a comparative examination with other global hub ports, recognising Durban's natural deep-water harbour and its proximity to industrial and manufacturing hubs as competitive strengths. Furthermore, the thematic exploration

highlighted the impact of Durban Harbour's location on regional trade dynamics, including its ability to serve as a gateway for landlocked Southern African countries, thus influencing trade patterns and cargo flow in the Southern Hemisphere. This multifaceted analysis provided a nuanced understanding of Durban Harbour's current position within global and regional trade networks and underscored the necessary strategic considerations for leveraging its geographical advantages to enhance its role as a major hub port.

In addition to stakeholder perceptions, quantitative port performance indicators provide an important empirical lens for evaluating Durban Harbour's competitiveness within global trade networks. International benchmarking frameworks such as the Container Port Performance Index (CPPI) emphasise that operational performance metrics, particularly vessel time in port, service reliability and terminal efficiency, are increasingly used to compare ports globally and to inform carrier route decisions (World Bank and S&P Global, 2024). These indicators are important because hub ports are typically selected not only for geographic centrality but also for their ability to minimise turnaround times and maintain predictable container flows under high-volume conditions (UNCTAD, 2023). Therefore, integrating comparative throughput measures such as TEU volumes and CPPI performance indicators into the discussion strengthens the empirical basis for assessing Durban Harbour's position relative to established hub ports and clarifies the extent to which geographic advantages translate into operational competitiveness (World Bank and S&P Global, 2024). Below is the discussion of the themes that emerged from the interviews.

4.4.1.1 Strategic Geographical Advantage

In analysing Durban Harbour's strategic geographical advantage within major trade routes, the sentiments shared by participants illuminated the port's pivotal role. Their emphasis on the natural and strategic positioning that endows Durban Harbour with a distinctive edge in global maritime logistics integrates seamlessly with existing literature, offering a comprehensive narrative of its potential as a leading hub.

Participant 1's submission highlighted the critical aspect of Durban Harbour's location: *"Durban Harbour's unique positioning on the eastern coast of South Africa offers unparalleled access to both the Indian and Atlantic Oceans, making it a critical point for international shipping lanes that connect the East and the West."* This insight, reflecting Notteboom and Rodrigue's (2012) observations, underscores the significant impact of geographical location on a port's international trade role, portraying Durban as an indispensable maritime node.

Participant 2 further elucidated on physical capabilities, stating that "*The natural deep-water harbour facilitates the docking of large vessels, which is a competitive advantage in attracting global shipping lines looking for efficient turnaround times."* Mirroring academic findings by Notteboom (2005), this statement highlights the critical role of infrastructural capabilities in sustaining a port's competitiveness and relevance.

Participant 3 touched on the regional economic implications, citing the importance of the port's position to the international trade routes, "*Its proximity to major South African industrial and manufacturing hubs means that Durban Harbour is not just a point of transit but a crucial part of the supply chain, enhancing its strategic importance further."* This further aligns with the literature on regional economic integration. Ferrari et al. (2011), suggest that ports closely integrated with regional industries significantly bolster their strategic stature.
Participant 4 emphasised the port's regional significance: *"One of the key strengths of Durban Harbour lies in its ability to serve as a gateway for landlocked Southern African countries. This positions it as a central hub in the region's trade network, directly influencing trade patterns and cargo flow in the Southern Hemisphere."* Supported by literature on the economic geography of ports (Notteboom and Rodrigue, 2012), this perspective reinforces Durban's role in facilitating regional trade, affirming its strategic geographical advantage.

Participant 5 offered a comparative and forward-looking viewpoint regarding the Durban Harbour elaborating that *"Comparing Durban with other ports in the hemisphere, its geographical advantage is clear. However, leveraging this advantage fully requires continuous investment in port infrastructure and technology to keep pace with global standards."* This underscores the necessity of augmenting natural geographical advantages with strategic investments, resonating with scholarly discussions on the need for ports to evolve alongside maritime trade demands (Ng and Gujar, 2009).

Together, these insights from participants weave a narrative that not only aligns with, but also expands upon the existing literature on maritime logistics and port management. The consensus on the importance of geographical positioning, infrastructure capabilities, and the imperative for strategic investment highlights a multifaceted approach required for developing and maintaining a competitive port. The practical implications of these factors, as illustrated by participants, emphasise the operational and strategic development intricacies facing ports like Durban Harbour in the dynamic landscape of global maritime trade.

4.4.1.2 Port Comparative Advantage

When delving into Durban Harbour's comparative stance compared with global hub ports, especially its geographical positioning and trade benefits, participants brought forward a rich tapestry of perspectives. These insights delineate Durban's position within the maritime logistics network and underscore areas of competitive edge and potential growth when juxtaposed against international counterparts.

Participant 1 drew a direct parallel noting the advantages the Durban Habour Port posseses when compared with other ports worldwide. *"When you look at Singapore or Rotterdam, Durban has a unique advantage being closer to the East-West trade route, serving as a crucial link, especially for cargo destined to and from the Southern Hemisphere."* This assertion aligns with Nguyen and Notteboom's (2019) insights on strategic location as a pivotal determinant of a port's global trade role. The literature indicates that, akin to Singapore and Rotterdam, ports that strategically leverage their location can become central nodes in shipping lanes, suggesting Durban's potential for regional specialisation.

Furthering this narrative was supported by *Participant 2* who spotlighted infrastructural elements, stating that *"Durban's natural deep-water port is a significant asset. Yet, compared to ports like Shanghai or Dubai, there's a noticeable gap in terminal automation and digital logistics integration."* This reflects the literature's emphasis on technological advancement for enhancing port efficiency (Parola Risitano, M., and Veenstra., 2013a), suggesting a critical area where Durban Harbour could bridge the gap to maintain competitiveness.

Participant 3 accentuated Durban's operational efficiency, mentioning that "*Unlike many North American or European ports, Durban has less congestion and can offer quicker turnaround times. This could be leveraged more effectively to attract transhipment cargo, similar to how Panama or Suez are utilised."* The literature underscores operational efficiency's role in port selection (Notteboom, 2005), reinforcing Durban's potential as a competitive hub with strategic marketing and management.

Elaborating on economic synergies, *Participant 4* observed, *"Durban's position not only facilitates access to African markets but also offers a gateway to the Indian Ocean and beyond.*

However, ports like Jebel Ali have developed extensive free zones and logistic parks, creating an entire ecosystem around the port." This resonates with Jacobs and Hall's (2007) findings on economic clusters, suggesting Durban's potential to expand influence through integrated economic zones.

On the issue of strategic partnerships, *Participant 5* reflected, *"Durban has the potential to outperform many of its peers in the Southern Hemisphere, but it requires a more aggressive approach towards developing maritime partnerships and alliances, similar to how Singapore has cultivated its network."* This mirrors scholarly discussions on the significance of strategic relationships in elevating a port's global standing (Notteboom and Rodrigue, 2012a), advocating for a proactive approach in Durban.

Highlighting sustainability, *Participant 6* noted, *"Durban's approach to sustainable port development is commendable. It's an area that could set it apart from competitors, especially as global shipping moves towards greener practices."* Literature on green port initiatives (Acciaro et al., 2014) supports this emerging domain, indicating Durban's potential to distinguish itself by aligning with environmental trends. Finally, addressing resilience, *Participant 8* also commented, *"In the face of global challenges like climate change and geopolitical tensions, ports like Durban need to be agile. Hong Kong and Hamburg have shown resilience by adapting their operations and strategies swiftly."* This is echoed in recent literature (Becker et al., 2018) emphasising the importance of adaptability for ports to maintain their hub status amidst uncertainties.

In weaving participant insights with scholarly discourse, a nuanced narrative emerges that not only validates Durban Harbour's strategic geographical advantages but also outlines a comprehensive roadmap for leveraging these strengths. The dialogues reveal a consensus on the critical role of geographical positioning, infrastructure modernisation, and the adoption of sustainability practices—areas aligned with academic perspectives yet enriched by practical considerations from maritime experts.

4.4.1.3 Location's Impact on Regional Trade

In dissecting Durban Harbour's geographical positioning and its consequential effects on regional trade dynamics, participant discussions illuminated the strategic nuances shaping the

port's influence over Southern Africa's economic fabric. This deliberation traverses both the port's facilitative and restrictive aspects in the regional trade context, portrayed through stakeholders' insights.

Participant 1 underlined the strategic boon of Durban Harbour, stating that *"Durban Harbour's proximity to key African markets and its accessibility from major international sea routes make it an indispensable node for regional trade. Its location not only serves South Africa but also acts as a gateway for landlocked countries in Southern Africa, facilitating their access to global markets."* This sentiment dovetails with Notteboom and Rodrigue's (2012b) literature, emphasising the significance of geographical positioning for ports. Like Durban Harbour, ports strategically placed along major sea routes can significantly influence regional trade flows and act as pivotal gateways for hinterland regions, reaffirming Durban's role in bolstering regional economic integration.

However, *Participant 2* shed light on inherent infrastructural challenges, observing that *"While Durban's position is advantageous, the lack of sufficient hinterland connectivity sometimes acts as a bottleneck, limiting its effectiveness in serving the wider region. Improving rail and road networks to neighbouring countries could significantly enhance its role in facilitating regional trade."* This critique mirrors concerns within academic circles (Nguyen and Notteboom, 2019) about the pivotal role of efficient transport networks in extending a port's influence beyond its immediate geographic confines. Addressing these infrastructural deficiencies, as suggested, could further cement Durban's stature as a regional trade hub.

Further advocating for Durban's regional significance, *Participant 3* proposed that *"Durban is more than just a port; it is a logistical hub that supports the economic activities of several African countries. If leveraged with smart infrastructure investments, its strategic location could transform the Southern African region into a more cohesive economic unit, attracting more international investment."* This vision aligns with scholarly dialogues (Notteboom, 2005; Wang and Ducruet, 2012a) on ports' potential as catalysts for economic integration, highlighting strategic investments as key to unlocking Durban's transformative impact on regional trade dynamics.

Participant 4, touching on the competitive landscape, stated that *"Comparatively, Durban stands out in the Southern Hemisphere for its location. However, competition from other*

emerging ports in East and West Africa, strategically located and receiving substantial investments, means Durban must continuously innovate and upgrade to maintain its regional leadership." This perspective intersects with literature (Notteboom and Rodrigue, 2012), noting the dynamic nature of global port competition and urging continuous innovation and strategic development to preserve a port's relevance and leadership in facilitating regional trade.

On the notion of adopting global best practices, *Participant 6* stated,*"Looking at global trade dynamics, Durban's location positions it as a vital link between the East and West, similar to how Singapore functions in Asia. The key difference is how each port leverages its geographical advantage through infrastructure, policies, and partnerships. Durban has much to gain by adopting some of these best practices."* This insight reaffirms Durban's strategic positioning akin to global benchmarks like Singapore and underlines the necessity of harnessing this geographical leverage through infrastructural and strategic enhancements, resonating with academic advocacy for comprehensive strategic approaches (Notteboom and Rodrigue, 2012).

In synthesising participant insights with scholarly discourse, a layered narrative emerges, affirming Durban Harbour's pivotal geographical positioning while outlining a roadmap for its enhanced role in regional trade. These dialogues, echoing and expanding upon academic themes, spotlight both the port's potential and the imperative strategic shifts required to capitalise fully on its geographical assets. This discourse not only corroborates the strategic importance of geographical positioning and infrastructural enhancements but also introduces a detailed blueprint for elevating Durban Harbour's influence across Southern Africa's economic landscape, enriched by stakeholders' pragmatic viewpoints.

4.4.2 Infrastructure and Capacity Constraints

The analysis of the infrastructure theme highlights several structural and operational challenges that continue to constrain Durban Harbour's transformation into a competitive container hub port. Infrastructure capacity remains a fundamental determinant of port competitiveness because it directly influences the ability of ports to accommodate large vessels, process cargo efficiently, and integrate effectively with global logistics networks. Participants consistently emphasised that while Durban Harbour possesses a strategic geographic location within

Southern Hemisphere maritime routes, the port faces significant infrastructural limitations that reduce its ability to compete with emerging hub ports such as Tanger Med in Morocco and Port Said in Egypt. These concerns reflect broader global trends in the maritime sector, where infrastructure capacity and operational efficiency increasingly determine a port's position within global shipping networks (UNCTAD, 2022). Contemporary port performance evaluations further indicate that ports with advanced infrastructure and modern terminal facilities achieve higher operational productivity and attract greater volumes of international shipping traffic (World Bank & S&P Global, 2023). Consequently, infrastructure development remains a critical factor in determining whether Durban Harbour can successfully reposition itself as a regional hub port.

One of the most significant infrastructure challenges identified by participants relates to the port's capacity to accommodate the growing size of container vessels operating within global shipping networks. The deployment of ultra-large container vessels has become increasingly common on major maritime trade routes, requiring ports to maintain deeper channels, longer berths and expanded terminal space. Participant 1 emphasised that current infrastructure limitations significantly restrict Durban Harbour's ability to host these larger vessels. The participant explained that *"The current berth depth and terminal space are significantly constraining Durban Harbour's capacity to accommodate the new generation of mega-ships. Without the ability to host these larger vessels, we're at a competitive disadvantage."* This observation reflects a critical structural constraint affecting the port's competitiveness. Global shipping alliances increasingly prioritise ports capable of accommodating mega-vessels because these vessels offer economies of scale that reduce shipping costs and improve operational efficiency (UNCTAD, 2022). Ports unable to accommodate these vessels often become secondary nodes within hub-and-spoke shipping networks, receiving cargo through feeder services rather than serving as primary hubs. The concerns raised by participants therefore highlight the direct relationship between berth infrastructure and a port's ability to participate effectively in global maritime trade networks.

Closely related to vessel accommodation challenges are the operational inefficiencies created by limited terminal capacity. Participants noted that restricted terminal space and limited container handling capacity often lead to operational bottlenecks that affect cargo processing efficiency. Participant 2 highlighted the cascading operational effects of these limitations, stating that *"The limited terminal space not only affects our ability to handle larger vessels but*

also impacts the efficiency of cargo handling operations. This results in longer turnaround times and could deter shipping lines from using Durban as a preferred hub." This insight highlights the complex relationship between infrastructure capacity and port productivity. Container terminals function as the operational core of modern ports, where efficient cargo handling, storage and transfer activities determine overall logistics performance. Ports that lack sufficient yard capacity or modern handling equipment often experience congestion, increased container dwell times and reduced operational reliability (Rodrigue, 2020). Recent global port assessments demonstrate that operational efficiency plays a decisive role in shipping line route selection, as shipping companies prioritise ports capable of delivering faster turnaround times and reliable cargo handling services (World Bank & S&P Global, 2023). In the case of Durban Harbour, the operational inefficiencies identified by participants therefore represent a significant barrier to achieving hub port status.

Another key issue raised by participants concerns the level of infrastructure investment required to modernise the port and expand its capacity. Participant 3 pointed to a perceived lag between global trade growth and the rate of infrastructure development at Durban Harbour. The participant observed that *"Investments in port infrastructure have not kept pace with the growth in global trade volumes. This lag in expanding and modernising the port's facilities is a major inhibitor to Durban Harbour's hub ambitions."* This perspective reflects a widely recognised challenge in port development, where infrastructure expansion must continuously adapt to the increasing scale and complexity of global trade flows. Global maritime trade has expanded significantly over the past two decades, driven by the growth of containerised cargo and the expansion of global supply chains (UNCTAD, 2022). Ports that fail to expand infrastructure capacity in line with these trends often struggle to maintain competitiveness within international shipping networks. In the South African context, Transnet has acknowledged the need for significant investment in port infrastructure to improve operational performance and expand container handling capacity. Recent Transnet strategic planning initiatives emphasise infrastructure modernisation, terminal expansion and improved logistics coordination as key priorities for enhancing the competitiveness of South African ports (Transnet, 2023). These initiatives highlight the importance of sustained infrastructure investment in addressing the capacity constraints identified by participants.

Operational congestion within terminal areas also emerged as a recurring theme during the interviews. Participants described how infrastructure limitations contribute to congestion

during periods of high cargo demand, particularly during peak trading seasons. Participant 4 provided a practical illustration of these challenges, explaining that *"During peak seasons, the congestion within the terminal and the lack of sufficient docking space create significant bottlenecks. It's a clear sign that our infrastructure is not equipped to handle current, let alone future, demand."* Congestion within container terminals is widely recognised as one of the most significant operational challenges affecting port performance. When terminal infrastructure is unable to accommodate increasing cargo volumes, operational delays can occur at multiple stages of the logistics process, including vessel berthing, container unloading and cargo distribution (Rodrigue, 2020). These delays not only increase operational costs but may also reduce the reliability of port services, thereby discouraging shipping lines from using the port as a major logistics hub. According to the World Bank Container Port Performance Index, ports that experience persistent congestion often perform poorly in global efficiency rankings, highlighting the importance of adequate infrastructure capacity in maintaining operational performance (World Bank & S&P Global, 2023).

Participants also emphasised the importance of adopting a comprehensive and forward-looking investment strategy to address these infrastructure challenges. Participant 5 highlighted the need for a coordinated approach that integrates physical infrastructure expansion with technological modernisation and strategic partnerships. The participant suggested that *"There's a critical need for a comprehensive investment strategy that prioritises deepening and widening berths, expanding terminal space, and integrating advanced technologies for better cargo handling. Strategic partnerships and private investment could be key in accelerating these upgrades."* This perspective reflects a growing trend within global port development where governments increasingly collaborate with private sector partners to finance large-scale infrastructure projects. Public-private partnerships have become a common mechanism for funding port infrastructure expansion, particularly in developing economies where public resources may be limited (UNCTAD, 2022). In South Africa, Transnet has also begun exploring increased private sector participation in port infrastructure development as part of broader logistics sector reforms aimed at improving operational efficiency and attracting investment (Transnet, 2023). These developments suggest that strategic collaboration may play an important role in accelerating infrastructure development at Durban Harbour.

Finally, participants highlighted the importance of benchmarking Durban Harbour against leading international ports in order to identify best practices and technological innovations that

could enhance operational efficiency. Participant 6 emphasised the need for technological modernisation, stating that *"Comparing Durban with leading global ports, the gap in infrastructure and technology adoption is evident. Targeted investment in automation and digitisation could significantly enhance our capacity and operational efficiency, aligning Durban Harbour more closely with international standards."* The adoption of automation technologies and digital logistics systems has become a defining feature of modern container hub ports. Technologies such as automated stacking cranes, advanced terminal operating systems and digital port community platforms have significantly improved cargo handling productivity and supply chain coordination in many leading ports (UNCTAD, 2022). Ports that successfully integrate digital infrastructure into their operational systems are often able to reduce container dwell times, improve logistics transparency and enhance overall service reliability (World Bank & S&P Global, 2023). The insights provided by participants therefore suggest that technological innovation, alongside physical infrastructure expansion, will be essential for improving Durban Harbour's competitiveness within global maritime trade networks.

In conclusion, the findings from participant interviews reveal that infrastructure and capacity constraints remain among the most significant barriers to Durban Harbour's development as a container hub port. The discussions highlight several interconnected challenges, including insufficient berth depth, limited terminal capacity, congestion within cargo handling areas and inadequate infrastructure investment. These limitations collectively reduce the port's ability to accommodate larger vessels, process cargo efficiently and compete effectively with emerging hub ports in other regions. Importantly, the concerns raised by participants align closely with contemporary industry assessments and national infrastructure development strategies. Transnet's infrastructure expansion plans, including initiatives aimed at upgrading container terminals and improving port logistics systems, represent important steps toward addressing these challenges. Nevertheless, sustained investment in infrastructure modernisation, technological innovation and logistics integration will be essential if Durban Harbour is to realise its potential as a competitive hub port within the evolving global maritime trade system.

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4.4.3 Investment and Funding Challenges

According to the investment theme, participants shed light on the investment and funding challenges faced by Durban Harbour in its journey toward becoming a leading container hub port. This complex theme explores the financial hurdles and perceived inadequacies in securing the investments necessary for the port's expansion and modernisation. The shared insights offer a vivid picture of the financial landscape and the hurdles that stand in the way of Durban Harbour's development ambitions.

Participant 1 pinpointed a foundational issue with a financial model adopted to fund ports in South Africa stating that *"The financial models currently in place are not sufficient to support the scale of investment needed for Durban Harbour's expansion. Traditional funding methods are falling short of meeting the port's modernization requirements."* Highlighting a critical misalignment between existing financial structures and the investment required to elevate Durban Harbour to global standards, this perspective suggests a pressing need for innovative financing solutions. This observation aligns with Baird (2007) and Brooks and Cullinane (2007), who argue that traditional funding mechanisms often fail to meet the capital-intensive demands of modern port development projects, pointing toward the necessity of innovative financing solutions, including public-private partnerships (PPPs).

Elaborating on the complexities of securing investment, *Participant 2* observed, *"Even with a clear understanding of what needs to be done, the challenge often lies in convincing investors and securing the necessary capital. There's a perception of high risk which makes attracting private investment particularly difficult."* This insight illuminates the challenge of attracting private investment due to perceived risks, emphasising the need for enhanced risk mitigation strategies. Studies by Estache, Serebrisky, and Veredas (2005) and Van der Lugt, De Langen, and Hagdorn (2014) corroborate this, highlighting how risk perceptions among private investors can significantly hinder investment flows into port projects, particularly in regions facing economic challenges.

Participant 3 offered a broader economic viewpoint noting that *"In the context of South Africa's economic challenges, securing public funding for port development competes with other critical infrastructural needs. This often results in port projects being deprioritised, further complicating the funding landscape."* This comment touches on the competitive

environment for public funds within South Africa's broader economic framework, suggesting that port projects often struggle for prioritisation. This reflects discussions by Brooks and Pallis (2011) and Wilmsmeier and Notteboom (2011), who explore the fiscal constraints governments face in allocating resources to port development amid competing national priorities.

Highlighting a potential avenue for overcoming these funding barriers, *Participant 4* suggested that *"Leveraging public-private partnerships could be a game-changer for Durban Harbour. These partnerships can unlock new funding sources and bring in expertise from the private sector, but they require clear frameworks and mutual benefits to be successful."* Advocating for public-private partnerships as a solution to funding challenges underlines the importance of clear frameworks and aligned interests for successful collaborations, a sentiment echoed in the literature by Cheon, Dowall, and Song (2010) and Van der Lugt et al. (2014), which identifies PPPs as effective mechanisms for mobilising private capital and combining public policy objectives with private sector efficiency.

On the necessity of strategic investment, *Participant 5* emphasised the point on investment stating that *"Investment should not just focus on physical infrastructure but also on building a digital and sustainable port ecosystem. However, securing funding for these forward-looking projects is challenging without demonstrating immediate returns."* This perspective extends the investment discussion to encompass digitalisation and sustainability, highlighting the challenges of securing funding for projects crucial for long-term competitiveness. This aligns with Becker, Asaftei, Finnoff, and Gulati (2012), who discuss the hurdles in financing forward-looking port projects, underscoring the emphasis on short-term returns in investment decisions.

Delving into funding mechanisms, *Participant 6* remarked, *"The availability of international funding and grants for port development is there, but accessing these funds often requires navigating complex application processes and meeting stringent criteria. Durban Harbour needs a dedicated team to focus on tapping into these resources."* Highlighting the opportunities and challenges associated with international funding, this insight suggests the need for specialised expertise to effectively leverage global financial resources, a notion supported by Ng and Gujar (2009) and Wang et al. (2013), which acknowledges the potential of international funding while pointing out the bureaucratic hurdles that impede access.

In synthesising these participant insights, it becomes clear that Durban Harbour faces multifaceted investment and funding challenges, from the inadequacy of current financial models to the complexities of attracting private investment and the competitive landscape for public funds. However, the potential of public-private partnerships and international funding presents optimistic pathways, provided there is strategic focus and dedicated effort. Overcoming these financial hurdles is crucial for realising Durban Harbour's ambitions as a significant container hub port, underscoring the need for innovative strategies and collaborative efforts in securing the investments required for its development on both the regional and global stages.

4.4.4 Regulatory and Bureaucratic Hurdles

Exploring the regulatory and bureaucratic challenges, participants painted a complex picture of the hurdles facing Durban Harbour's growth into a leading hub. This critical dialogue unpacks the ways governmental policies, regulatory frameworks, and procedural intricacies facilitate or thwart development efforts, providing an in-depth look at the regulatory maze guiding port evolution.

Participant One delved into the crux of the issue: *"The regulatory framework governing port development in South Africa is exceedingly complex and often results in protracted approval processes for new projects. This can significantly delay vital developments needed to enhance the port's capacity and efficiency."* This statement underscores the tension between developmental urgency and the lethargic pace imposed by regulatory complexities, pinpointing a crucial improvement area. Literature aligns with this viewpoint, underscoring regulatory efficiency as pivotal for port competitiveness (Brooks and Pallis, 2008), and advocating for streamlined processes as essential port development enablers (Notteboom, 2010).

Offering a concrete instance, *Participant Two* shared: *"We recently faced a situation where a crucial expansion project was stalled for months due to bureaucratic red tape, despite clear evidence of its economic and operational benefits. It's frustrating to see opportunities slip away because of procedural delays."* This narrative vividly depicts bureaucratic hurdles' real-world impacts on development timelines, emphasising opportunity costs. The literature identifies bureaucratic inertia as a barrier to timely port infrastructure implementation (Rodrigue, 2007),

highlighting procedural delays' potential to hinder a port's market responsiveness (Pallis et al., 2011).

Shifting focus, *Participant Three* noted the broader implications: *"Regulatory and bureaucratic challenges are not unique to Durban Harbour, but the way they are managed here does not always support agile development. Other international ports seem to have more streamlined processes that allow them to adapt and grow more swiftly."* This global perspective suggests potential benefits in adopting more efficient regulatory management practices seen in leading ports worldwide. Literature advocates for benchmarking against regulatory best practices (Notteboom and Winkelmans, 2001), indicating a consensus on the advantages of streamlined regulatory processes (Wang and Ducruet, 2012b).

Addressing potential solutions, *Participant Four* suggested: *"Engagement between port authorities and regulatory bodies needs to be strengthened. A collaborative approach could help identify and remove unnecessary bureaucratic obstacles, making it easier to push through critical developments."* This viewpoint emphasises dialogue and cooperation as key to navigating regulatory challenges, suggesting a more integrated approach could smooth out development processes. This call for collaborative regulatory management introduces a forward-thinking approach, echoing emerging discussions in literature advocating for regulatory frameworks to adapt alongside technological advancements and trade dynamics (Acciaro et al., 2014).

Participant Five highlighted the need for regulatory dynamism: *"Regulatory frameworks should be dynamic and adaptable to the changing needs of maritime trade and port development. The current rigidity makes it difficult to implement innovative solutions that could significantly enhance port operations and sustainability."* This insight underlines the importance of evolving regulations in line with industry progress and global standards, ensuring Durban Harbour remains competitive.

Focusing on environmental considerations, *Participant Six* remarked: *"Navigating environmental regulations is particularly challenging. While the intent to protect our natural resources is clear and necessary, the process is often lengthy and unclear, which can delay projects that are designed to improve environmental sustainability at the port."* This comment

stresses the intricate balance between environmental stewardship and development, highlighting the necessity for more streamlined environmental regulatory processes.

From the global maritime community's perspective, *Participant Seven* observed: *"International standards and regulations also play a significant role in our development plans. Aligning with these while navigating local bureaucratic processes can be like walking a tightrope, requiring a careful balance to ensure compliance on all fronts."* This highlights the dual challenge of meeting local and international regulatory standards, essential for Durban Harbour's global hub aspirations.

Advocating for reform, *Participant Eight* called for action: *"There's a pressing need for regulatory reform that specifically targets efficiency and facilitation of port development. Simplifying processes, improving transparency, and setting clear timelines could transform how projects are implemented."* This perspective champions systemic reforms to mitigate bureaucratic obstacles, suggesting streamlined processes could revolutionise project execution.

Highlighting investment impacts, *Participant Nine* emphasised: *"The regulatory environment is a key factor for investors when considering port projects. The current hurdles can deter investment, crucial for our expansion and modernization efforts. Making the regulatory process more investor-friendly should be a priority."* This insight links the regulatory climate directly to the port's investment appeal, underlining bureaucratic complexities' economic implications.

Synthesizing participant insights reveals that navigating regulatory and bureaucratic challenges is pivotal for Durban Harbour's development. These insights suggest pathways for both academic and practical advancements in streamlining regulatory processes, advocating for dynamic regulations that adapt to maritime trade's evolving needs, and enhancing collaboration between port authorities and regulatory bodies. Addressing these challenges can create a conducive environment for development, drawing investment and solidifying Durban Harbour's ambitions as a premier global hub. The synthesis not only aligns with established literature on the importance of regulatory efficiency and adaptability but also highlights innovative solutions such as regulatory reform and enhanced stakeholder collaboration.

Addressing the environmental regulatory hurdles, as noted by *Participant Six*, reflects a growing scholarly focus on integrating sustainable development practices into port operations (Woo et al., 2011). However, the emphasis on streamlining these processes to facilitate projects aimed at improving sustainability presents a nuanced challenge that extends academic discussions. It underscores the need for regulatory frameworks that not only safeguard environmental interests but also facilitate development projects aligning with sustainable practices.

The call for regulatory reform, particularly for enhancing efficiency and facilitating port development as advocated by *Participant Eight*, echoes the scholarly argument for overhauling bureaucratic processes to support port competitiveness (Brooks and Pallis, 2008; Notteboom, 2010). This perspective on systemic reforms highlights the potential transformative impact on project implementation, suggesting that simplification, transparency, and clear timelines could significantly reduce bureaucratic hurdles.

Moreover, the focus on making the regulatory environment more investor-friendly, as highlighted by *Participant Nine*, ties directly into discussions on the economic implications of bureaucratic complexities. By creating a regulatory landscape that is conducive to investment, Durban Harbour can better attract the capital necessary for its expansion and modernisation efforts, aligning with literature that identifies the regulatory climate as a critical factor for investment decisions in port projects (Estache et al., 2005; Van der Lugt et al., 2014).

In summary, the discourse on regulatory and bureaucratic hurdles facing Durban Harbour's development provides a comprehensive view that resonates with and expands upon existing literature. It identifies both challenges and potential solutions for navigating the regulatory landscape, emphasising the need for dynamic, adaptable regulations and the importance of collaborative efforts between port authorities and regulatory bodies. These insights not only validate concerns highlighted in academic research but also offer practical considerations for operationalising strategic themes in port development. By addressing these regulatory and bureaucratic challenges through targeted reforms and stakeholder engagement, Durban Harbour can pave the way for a more streamlined development process, fostering an environment conducive to growth, innovation, and investment.

4.4.5 Proposals for Hub Port Development

In order to recommend strategies of developing Durban Harbour as a hub port, generalise the findings of semi-structured interviews with various stakeholders who included, port authority officials, shipping executive, logistics and policy makers had to be generalised. This thematic review has revealed the main suggestions to be based on the need to expand infrastructure, enhance its efficiency, develop measures to attract shipping lines, and amend the needed changes in regulations. Through these insights, the researcher was able to identify the immense need to improve the physical infrastructure, including deepening of berths and elongation of quays, to be able to accommodate larger ships. It focused on adopting modern digital technologies to enhance operational efficiencies and application of competitive tariffs and flexible pricing strategies to win more shipping lines. Another issue that was highlighted in the analysis was the necessity to introduce streamlined regulatory processes to achieve easier business operations. This thorough analysis presented a strategic plan on how Durban Harbour can be converted into an important container terminal by highlighting the multidimensional nature of the process, which requires the integration of multiple strategies, such as infrastructure responses, technology, competitive market, and responsiveness to the regulatory environment, to maximise the potential of the port and utilise its strategic geographic location to its benefit.

4.4.5.1 Infrastructure Expansion Needs

Participants provided a range of proposals for infrastructure expansion and enhancements to support Durban Harbour's development into a leading hub port. Their insights revealed a consensus on the need for specific infrastructural improvements to elevate the port's capacity, efficiency, and global competitiveness.

Participant One opened the discussion with a focus on the physical layout of the port, stating, *"Upgrading the container terminals to accommodate the latest generation of mega-ships is crucial. We need deeper berths and longer quays to ensure that Durban Harbour can handle the volume and size of vessels that constitute modern global trade."* This observation underscores the necessity of expanding the port's physical infrastructure to keep pace with the evolving dimensions of maritime logistics. The literature corroborates the critical importance of upgrading container terminals to accommodate larger vessels as a determinant of a port's

role in global maritime logistics (Notteboom and Rodrigue, 2012a). This adaptation aligns with the evolving dimensions of maritime logistics, where ports capable of handling mega-ships secure more traffic and enhance their hub status, reinforcing *Participant One's* assertion from a scholarly perspective (Pallis et al., 2011).

Building on this, *Participant Two* highlighted the role of connectivity, mentioning, *"Enhancing the road and rail networks linked to the port is just as important as expanding the terminals themselves. Efficient hinterland connections are essential for reducing bottlenecks and facilitating smoother cargo movement to and from the port."* This insight points to the importance of integrated transport links in maximising the port's operational efficiency and its attractiveness as a hub port. *Participant Two* highlighted the significance of enhanced hinterland connectivity, and this insight dovetails with scholarly discussions emphasising efficient transport links as essential for reducing bottlenecks and facilitating cargo movement (Rodrigue and Notteboom, 2009). The literature suggests integrated road and rail networks enhance a port's operational efficiency, thereby corroborating *Participant Two's* observation on the strategic role of connectivity in port development.

Participant Three addressed technological advancements, stating, *"Investing in automation and digital infrastructure is non-negotiable. Implementing state-of-the-art terminal operating systems and IoT solutions will boost efficiency and improve safety and security at the port."* This perspective emphasises the critical role of technology in modernising the port, suggesting that infrastructural enhancements should also include digital and automated systems. The focus on technological advancements and digital infrastructure by *Participant Three* resonates with the literature advocating for automation and smart technologies to boost port efficiency and safety (Heilig and Voß, 2017). This necessity for technological investment in enhancing port operations points to a consensus on the role of innovation in maintaining competitive port development, echoing *Participant Three's* insights within an academic context.

Focusing on sustainability, *Participant Four* noted, *"Any infrastructural expansion must also consider environmental sustainability. This means investing in green technologies and practices, such as electrification of equipment and renewable energy sources, to minimise the port's carbon footprint."* This comment integrates the concept of sustainable development into the conversation, highlighting the need for eco-friendly practices in port expansion efforts. *Participant Four*'s consideration of environmental sustainability aligns with a growing

scholarly focus on green port initiatives and integrating eco-friendly practices into port operations (Woo et al., 2011). This emerging discourse underscores the participants' contributions to expanding discussions around sustainable port development, aligning with but also potentially enriching the current academic dialogue.

Participant Five pointed out the necessity for specialised facilities, stating, *"Developing dedicated terminals for specific types of cargo, like bulk and liquid, can significantly enhance operational efficiency and attract more business to Durban Harbour. Specialisation can be a key differentiator in the competitive landscape of hub ports."* This insight suggests a strategic approach to infrastructural development, focusing on specialisation to cater to diverse market needs and improve service offerings. The literature on port competitiveness and development highlights the benefits of developing dedicated terminals to enhance operational efficiency and cater to specific market needs, echoing *Participant Five's* suggestion (Notteboom, 2006; Wang and Ducruet, 2012). This approach to specialisation within infrastructural development is practical and aligns with strategic insights from scholarly work, emphasising the importance of targeted enhancements to improve port service offerings and competitiveness.

Participant Six elaborated on the financial aspect of development, mentioning, *"Creating an investment-friendly environment is essential. This involves direct investment in infrastructure and creating policies and incentives that attract private sector participation in port development projects."* This observation links infrastructural enhancements to the broader economic and policy environment, underlining the importance of fostering a conducive investment climate to support the port's expansion and modernisation efforts. Reflecting on *Participant Six's* insights, the literature underscores the necessity of creating an investment-friendly environment and the role of policies and incentives in attracting private-sector participation (Notteboom, 2007; Brooks and Cullinane, 2007). This comprehensive view suggests a symbiotic relationship between infrastructural investment and policy formulation, which is crucial for facilitating the port's development ambitions.

Expanding on the theme of collaboration, *Participant Seven* emphasised the importance of stakeholder engagement, stating, *"For infrastructure projects to be successful, they must be developed in consultation with all port users, including shipping lines, freight forwarders, and logistics providers. This ensures that the upgrades align with the port's users' actual needs, enhancing the port operations' overall efficiency and effectiveness."* This perspective

highlights the value of collaborative planning and the alignment of infrastructure projects with the needs of the port's diverse user base, ensuring that enhancements are both practical and user-oriented. The academic discourse on port development similarly emphasises the importance of stakeholder engagement and collaboration in aligning infrastructure projects with user needs, supporting *Participant Seven's* insights (Brooks and Pallis, 2008; Pallis et al., 2011). This alignment between practical observations and scholarly recommendations highlights the critical role of collaboration in successful port development strategies.

Addressing resilience, *Participant Eight* pointed out, *"Investing in infrastructure also means investing in resilience. Durban Harbour needs to be prepared for future challenges, including climate change and digital security threats. This includes both physical infrastructure like seawalls and breakwaters, as well as cybersecurity measures for digital systems."* This insight extends the concept of infrastructural enhancement to include the need for resilience against both environmental and cyber threats, underlining the comprehensive approach required for future-proofing the port. The literature on port competitiveness and sustainability also stresses the importance of investing in resilience to future-proof ports against environmental and digital threats (Becker et al., 2012; Acciaro et al., 2014). *Participant Eight's* focus on resilience resonates with these academic perspectives, emphasising the necessity of a broad-based approach to infrastructure development that accounts for emerging challenges.

Lastly, *Participant Nine* brought attention to the role of public infrastructure, stating, *"The port's efficiency is also determined by the quality of public infrastructure surrounding it. Improvements in public utilities, access roads, and community facilities contribute to smoother operations and better support for the port's workforce."* This comment underscores the interconnectedness of port operations with the broader community and public infrastructure, suggesting that a holistic view of development is necessary for the port's success. The integration of port development with improvements in public infrastructure is highlighted in scholarly discussions as essential for enhancing port efficiency and supporting the port community (Ng and Gujar, 2009; Wang et al., 2013). This perspective suggests that successful port development extends beyond the confines of the port itself and includes a focus on the surrounding community and public infrastructure.

In summary, synthesising participant insights with scholarly work underscores a strong alignment between the perspectives on infrastructure expansion needs and the academic discourse on port competitiveness and development. While confirming the critical role of addressing physical capacity constraints, enhancing hinterland connectivity, investing in technology, and prioritising sustainability, the detailed discussions introduce practical considerations that enrich the academic dialogue. These insights offer valuable perspectives for integrating broad strategic themes into operational port development strategies, contributing to the complexities of evolving Durban Harbour into a leading hub port.

4.4.5.2 Operational Efficiency Improvements

Participant One highlighted a foundational aspect of operational efficiency: "Implementing a fully integrated port management system can revolutionise how we track, manage, and optimise cargo movement. Real-time data analytics would enable proactive decision-making, reducing delays and increasing throughput." This insight emphasises the potential impact of digitalisation on operational practices, suggesting that advanced data analytics could serve as the backbone for enhancing efficiency. The literature on port operations and management supports this view, highlighting the transformative role of digital technologies and real-time data analytics in optimising port activities (Heilig and Voß, 2017; Notteboom and Rodrigue, 2012a). This alignment underscores the critical importance of integrating digital solutions to achieve operational efficiency in modern ports.

Participant Two noted the importance of connectivity, stating, *"Upgrading to a 5G network within the port area could significantly improve communication between port operators, logistics companies, and shipping lines. Enhanced connectivity is key to supporting the Internet of Things (IoT) applications that can automate and streamline operations."* This observation underscores the role of advanced telecommunications infrastructure in enabling effective IoT solutions that enhance port operations. The academic discourse on the digital transformation of ports emphasises the necessity of robust connectivity for the deployment of IoT and automation technologies that drive efficiency improvements (Acciaro et al., 2014; Pallis et al., 2011), reflecting a consensus on the need for advanced network infrastructure in facilitating operational advancements.

Addressing a critical pain point, *Participant Three* remarked on the need for process optimisation, stating, *"Streamlining customs clearance procedures through digital platforms would greatly reduce waiting times for cargo processing. Simplified, faster customs operations are essential for attracting more business, especially for time-sensitive cargoes."* This comment highlights the importance of efficient regulatory processes in port operations. Literature on port efficiency frequently cites the streamlining of customs and regulatory procedures as a key area for improvement, advocating for the adoption of digital platforms to expedite processes and enhance port competitiveness (Nguyen and Notteboom, 2019; Wang and Ducruet, 2012). This insight from the participant aligns with scholarly recommendations, underscoring the significant impact of digitalisation in regulatory processes.

Focusing on environmental sustainability, *Participant Four* proposed, *"Investing in green technologies, like electric cranes and hybrid tugboats, not only reduces our carbon footprint but also improves operational efficiency by lowering fuel costs and maintenance downtime."* Integrating sustainability with operational efficiency, this perspective resonates with recent academic discussions on the benefits of adopting green technologies within port operations (Woo et al., 2011; Acciaro et al., 2014). The literature highlights the dual advantages of such technologies in reducing environmental impacts and operational costs, supporting the participant's viewpoint on the importance of sustainability in operational enhancements.

Turning to human resources, *Participant Five* emphasised the role of workforce development, stating, *"Enhancing staff training programmes, especially in digital skills and advanced operational technologies, is crucial. A highly skilled workforce is the cornerstone of efficient port operations and innovation adoption."* This reflection on the importance of human capital in achieving operational excellence aligns with literature that identifies workforce development as a critical factor in port competitiveness and the successful adoption of new technologies (Notteboom and Winkelmans, 2001; Pallis et al., 2011). The emphasis on training and skills development is consistent with academic perspectives, highlighting the necessity of investing in human resources as part of a comprehensive strategy for operational improvement.

In summarising the discussions on operational efficiency improvements at Durban Harbour, it's evident that the insights from participants align closely with existing literature, while also providing detailed perspectives that could enrich academic discussions. The emphasis on

digitalisation, connectivity, streamlined processes, sustainability, and workforce development forms a comprehensive view of the strategies needed to enhance port operations. These insights not only corroborate scholarly recommendations, but also offer practical considerations for implementing operational efficiency measures, contributing to the ongoing discourse on port management and technological advancements in the maritime industry.

4.4.5.3 Strategies for Attracting Shipping Lines

Given the intricate nature of maritime logistics and the competitive global port landscape, participants offered a wealth of strategies to enhance Durban Harbour's appeal to significant shipping lines and logistics providers. Their insights suggest a multifaceted approach encompassing infrastructural improvements, operational efficiencies, and more.

Participant One emphasised the importance of reliability, stating, *"Building a reputation for reliability and efficiency is crucial. Ensuring that ships can berth on arrival without delay and cargo handling is swift and predictable will make Durban Harbour a preferred choice for shipping lines."* This perspective underscores the pivotal role of operational excellence in attracting and retaining business, highlighting the necessity for the port to prioritise minimising delays and maximising efficiency. The literature supports this view, indicating that shipping lines prioritise ports known for their reliability and operational efficiency, underscoring Durban's need to maintain high standards in these areas (Notteboom, 2006; Pallis et al., 2011).

Building on the theme of operational efficiency, *Participant Two* proposed, *"Offering competitive tariffs and flexible pricing strategies can significantly boost the port's appeal. Tailoring pricing structures to meet the specific needs of shipping lines and logistics providers could give Durban an edge over competitors."* This insight points to the strategic use of pricing as a means to draw more business, suggesting that financial incentives could heavily influence the decision-making process for shipping lines. The academic consensus suggests that competitive pricing strategies are indeed a critical factor in the port selection process by shipping lines, validating the approach suggested by the participant (Notteboom and Winkelmans, 2001; Brooks and Cullinane, 2007).

Addressing the technological aspect, *Participant Three* remarked, *"Adopting advanced digital platforms for port operations and logistics management can streamline processes and improve communication. This would make it easier for shipping lines and logistics providers to do business with us."* This comment underscores the maritime industry's growing expectation for digital solutions, indicating that technological advancements could significantly enhance the port's attractiveness. Literature on port management and logistics supports the idea that the digital transformation of port operations, including the adoption of advanced terminal operating systems and IoT solutions, is a key driver of efficiency and attractiveness to shipping lines (Heilig and Voß, 2017; Acciaro et al., 2014).

Focusing on creating a more business-friendly environment, *Participant Four* noted, *"Regulatory reforms and simplifying bureaucracy would significantly attract shipping lines. Ensuring that Durban Harbour is operationally efficient and easy to do business with is essential."* This broadens the scope of attractiveness beyond physical and operational factors to include ease of doing business, emphasising the importance of a supportive regulatory and administrative environment. This perspective is echoed in literature, highlighting the impact of a business-friendly environment on a port's ability to attract and retain shipping lines and logistics providers (Woo et al., 2011).

Participant Five delved into the aspect of connectivity, stating, *"Enhancing hinterland connectivity through improved rail and road infrastructure would make Durban Harbour more attractive by reducing inland transport costs and times. This is a major factor for shipping lines when choosing a port."* This insight highlights the link between port efficiency and broader supply chain considerations, emphasising the importance of efficient hinterland connections. The literature corroborates this view, stressing the significance of hinterland connectivity in the attractiveness of a port to shipping lines (Nguyen and Notteboom, 2019).
By interweaving these insights with the academic discourse, it becomes evident that the strategies to enhance Durban Harbour's appeal to shipping lines and logistics providers require a holistic and informed approach. Operational excellence, competitive pricing, technological advancements, a business-friendly environment, and efficient hinterland connectivity emerge as key areas of focus. Through comprehensive strategies that address these aspects, Durban Harbour can enhance its competitiveness and position itself as a preferred hub in the global maritime logistics network.

4.4.5.4 Regulatory Reforms and Ease of Doing Business

The call for creating a more business-friendly environment through regulatory reforms and reducing bureaucracy, as noted by *Participant Four*, reflects the academic discourse on the impact of regulatory environments on port competitiveness (Brooks and Pallis, 2011; Wang and Ducruet, 2012). Literature suggests that ports operating within streamlined regulatory frameworks can attract more shipping lines due to the ease of conducting business. This underscores the importance of simplifying bureaucratic processes and aligning regulatory practices with the needs of the maritime logistics sector, confirming the validity of the participant's perspective.

As highlighted by *Participant Five*, enhancing hinterland connectivity through improved rail and road infrastructure is a theme that resonates strongly with current research. The literature underlines the importance of efficient hinterland connections for port competitiveness, emphasising that ports with robust links to inland transportation networks are more attractive to shipping lines due to reduced inland transport costs and times (Rodrigue and Notteboom, 2009; Nguyen and Notteboom, 2019). This insight corroborates the participant's suggestion, highlighting efficient hinterland connectivity as a major determinant in port selection by shipping lines.

The recommendation by *Participant Six* to offer a range of value-added services aligns with the literature on differentiation strategies for ports. Studies have shown that providing additional services, such as ship repair facilities and warehousing, can enhance a port's appeal by meeting the broader needs of shipping lines and logistics providers (Pallis et al., 2011; Notteboom, 2006). This strategy of diversification and specialisation in service offerings is widely acknowledged to improve a port's competitiveness, supporting the participant's insight.

Adopting and promoting green port initiatives, as *Participant Seven* mentioned, mirrors the growing scholarly emphasis on environmental sustainability in the maritime industry (Acciaro et al., 2014; Woo et al., 2011). The literature indicates that ports demonstrating a commitment to sustainability can attract environmentally conscious shipping lines as the industry moves towards greener practices. This aligns with *Participant Seven's* observation, suggesting that sustainability efforts can differentiate Durban Harbour in a competitive market.

Finally, the emphasis on establishing strategic partnerships as mentioned by *Participant Eight* is supported by literature highlighting the benefits of collaboration in the maritime logistics sector (Van der Lugt et al., 2014; Wang and Ducruet, 2012b). Collaborative initiatives and alliances with shipping lines and logistics providers can foster long-term relationships and mutual growth opportunities, a perspective that is echoed in academic discussions. This suggests that strategic partnerships are crucial for tailoring services to user needs and enhancing the port's overall value proposition.

In summary, the strategies suggested by participants for making Durban Harbour more attractive to shipping lines and logistics providers are well-grounded in recent literature, illustrating a comprehensive approach that aligns with established academic perspectives. These insights reaffirm the critical pathways identified in scholarly research for enhancing port competitiveness and highlight the practical considerations and strategic foresight necessary for Durban Harbour to position itself as a preferred hub in the global maritime logistics network.

4.4.6 Examine Economic Impact and Contribution to Trade

The research carefully studied comments on the interviews with the stakeholders who were engaged in or concerned with the activities and development programmes of Durban Harbour to identify the economic contribution and impact on trade. In this analysis, the major themes were identified in terms of the possible economic growth, the creation of jobs and the improvement of international trade that might be achieved in the case of the metamorphosis of the harbour into a central container hub. The knowledge that was acquired identified Durban Harbour as strategic to stimulate both regional and international trade flows and that its development would see a significant increase in the volume of trade, South Africa performing better in international markets and building stronger economic relationships with other regions of the world. The impacts on the local economy of such transformation were also discussed in the analysis, which pointed at the generation of good jobs and the possibility of having a significant impact on the GDP growth. When these insights were combined, the study was able to give a balanced insight into how the transformation of Durban Harbour into a hub port would trigger economic progress as a function of economic gain of greater trade efficiency and capacity.

4.4.6.1 Economic Growth and Job Creation

Given the intricate dynamics of maritime logistics and the competitive global port landscape, participants provided varied strategies to enhance Durban Harbour's attractiveness to major shipping lines and logistics providers. These insights suggest a multi-faceted approach, addressing everything from infrastructural enhancements to operational efficiencies and beyond.

Participant One emphasised the importance of reliability, stating, *"Building a reputation for reliability and efficiency is key. Ensuring that ships can berth on arrival without delay and cargo handling is swift and predictable will make Durban Harbour a preferred choice for shipping lines."* This perspective highlights the critical role of operational excellence in attracting and retaining business, underscoring the port's necessity to minimise delays and maximise efficiency. The literature supports this, showing that shipping lines prioritise ports known for their reliability and operational efficiency, aligning with Durban's need to maintain high performance in these areas (Notteboom, 2006; Pallis et al., 2011).

Participant Two suggested, *"Offering competitive tariffs and flexible pricing strategies can significantly enhance the port's appeal. Tailoring pricing structures to meet the specific needs of shipping lines and logistics providers could give Durban an edge over competitors."* This insight points to strategic pricing to attract more business, indicating that financial incentives could significantly influence shipping lines' choices. Competitive pricing strategies are indeed critical in the port selection process by shipping lines, confirming the effectiveness of such approaches (Notteboom and Winkelmans, 2001; Brooks and Cullinane, 2007).

Participant Three remarked, *"Adopting advanced digital platforms for port operations and logistics management can streamline processes and improve communication. Making it easier for shipping lines and logistics providers to do business with us."* This underscores the maritime industry's growing demand for digital solutions, indicating that technological advancements could significantly increase the port's attractiveness. The literature confirms that digital transformation in port operations, such as advanced terminal operating systems and IoT solutions, is essential for improving efficiency and attracting shipping lines (Heilig and Voß, 2017; Acciaro et al., 2014).

Participant Four focused on creating a more business-friendly environment through regulatory reforms and simplifying bureaucracy: *"Ensuring that Durban Harbour is not just operationally efficient but also easy to do business with is essential."* This broadens attractiveness beyond physical and operational factors to include the ease of business, highlighting the importance of a supportive regulatory and administrative environment. Literature echoes this sentiment, suggesting that ports offering a streamlined, transparent business environment can better attract shipping lines and logistics providers, reinforcing the need for regulatory efficiency and reduced bureaucratic hurdles (Brooks and Pallis, 2008; Notteboom, 2010).

Participant Five delved into the importance of hinterland connectivity: *"Enhancing rail and road infrastructure to reduce inland transport costs and times makes Durban Harbour more attractive, a major factor for shipping lines when choosing a port."* This insight stresses the significance of efficient hinterland connections in port attractiveness. Academic research supports this, indicating that solid hinterland connectivity is crucial for port competitiveness, as it facilitates cargo movement and reduces logistical costs for shipping lines (Rodrigue and Notteboom, 2009; Nguyen and Notteboom, 2019).

Participant Six suggested offering value-added services, such as ship repair facilities and warehousing, to make Durban Harbour a one-stop shop. This recommendation points to diversifying the port's service offering to meet a broader range of customer needs, enhancing overall attractiveness. Literature on port management supports that offering comprehensive, value-added services can significantly increase a port's appeal to shipping lines by providing conveniences and efficiencies not available elsewhere (Notteboom and Winkelmans, 2001; Pallis et al., 2011).

Participant Seven highlighted the appeal of green port initiatives to environmentally conscious shipping lines: *"Adopting and promoting sustainability can differentiate Durban Harbour in a market increasingly focused on reducing carbon footprints."* This reflects the maritime industry's growing environmental concerns, suggesting that ports prioritising green initiatives can attract like-minded shipping companies. This perspective aligns with recent studies highlighting the importance of sustainability in port operations and offer its competitive advantage in attracting business (Acciaro et al., 2014; Woo et al., 2011).

Participant Eight emphasised the benefits of establishing strategic partnerships with shipping lines and logistics providers to foster long-term relationships and mutual growth opportunities. This underscores the value of collaborative approaches in creating a more attractive proposition for shipping lines. The literature suggests that strategic alliances and partnerships can enhance port attractiveness by enabling more tailored services and fostering collaborative innovation (Notteboom and Rodrigue, 2008; Ducruet and Notteboom, 2012).

Integrating these participant insights with scholarly findings illustrates a comprehensive strategy encompassing operational excellence, strategic pricing, technological innovation, regulatory efficiency, hinterland connectivity, value-added services, sustainability initiatives, and strategic partnerships. Durban Harbour can improve its attractiveness to shipping lines and logistics providers by addressing these key areas, positioning itself as a competitive and preferred hub in the global maritime logistics network. The consensus among participants and the literature highlights the multifaceted approach needed to make Durban Harbour a leading choice for international maritime commerce, emphasising the importance of adaptability, innovation, and strategic planning in the competitive global port landscape.

4.4.6.2 Boost to International Trade

Exploring how Durban Harbour's evolution into a hub port could boost international trade and economic relations with other regions, participants offered insights that reflect the multifaceted impact such a development could have. These perspectives highlight the potential for Durban Harbour to significantly influence global trade patterns, enhance South Africa's position in international markets, and foster stronger economic ties with various regions around the world.

Participant One articulated the direct impact on trade volumes, stating, *"By becoming a hub port, Durban Harbour could see a substantial increase in trade volumes. This is not just about the numbers; it's about positioning South Africa as a key player in global maritime trade, opening up new opportunities for economic engagement with countries across the globe."* This perspective underscores the strategic importance of Durban Harbour in enhancing South Africa's role in the international trade ecosystem, suggesting that hub status could lead to expanded trade relations and opportunities.

Expanding on this idea, *Participant Two* highlighted the role of connectivity, *"Enhanced connectivity through Durban Harbour would make it a preferred transhipment point for cargo moving between the East and West and between Africa and the rest of the world. This could significantly boost trade volumes and foster stronger economic links with key trading partners."* This insight points to the potential of Durban Harbour to serve as a critical node in global shipping networks, facilitating increased cargo flows and strengthening economic ties with essential trade regions.

Addressing the impact on regional trade, *Participant Three* remarked, *"As a hub port, Durban could play a pivotal role in boosting intra-African trade. Improved port facilities and services can encourage more African countries to route their trade through Durban, enhancing regional economic integration and cooperation."* This comment illustrates the broader implications of Durban Harbour's hub status for regional trade, suggesting that it could be a catalyst for increased economic integration within the African continent.

Focusing on the economic benefits, *Participant Four* noted, *"The ripple effects of increased trade volumes facilitated by Durban Harbour would be felt across various sectors of the economy, from manufacturing to services. This could increase GDP growth rates and strengthen economic relations with key international markets."* This perspective highlights the widespread economic advantages of boosting trade volumes through Durban Harbour, emphasising the potential for positive impacts on GDP growth and international economic relationships.

Turning to the competitive landscape, *Participant Five* suggested, *"Gaining hub status would position Durban Harbour competitively against other ports in Africa and beyond. This could attract more international shipping lines and logistics companies to South Africa, further enhancing our trade volumes and economic relations."* This insight points to the strategic value of hub status in attracting business, suggesting that competitiveness is key to increasing trade volumes and fostering economic relations.

On the theme of sustainability, *Participant Six* remarked, *"Adopting sustainable and green port practices as part of Durban's hub strategy could also attract eco-conscious shipping lines and shippers, aligning with global trends towards environmental responsibility in trade."* This comment integrates sustainability into the conversation, highlighting the potential for Durban

Harbour to attract business by aligning with global environmental trends, thereby positively influencing trade volumes and economic ties.

Highlighting the importance of strategic partnerships, *Participant Seven* stated, *"Establishing strategic partnerships with ports in other regions as part of Durban's hub port development could create synergies that enhance trade flows and open up new markets for South African exports."* This perspective underscores the potential benefits of collaborative efforts and partnerships in expanding trade opportunities and accessing new markets through Durban Harbour.

In drawing up these observations, it is notable that the potential hub status of Durban Harbour has great potential to increase the volume of international trade as well as improve South Africa's economic ties with rest of the world. The projected gains are varied as they will include augmented trade volumes and greater global connectivity, augmented regional incorporation and augmented competitiveness. Also, the focus on sustainability and strategic relationships underscores the multisided nature of the strategy that is required to bring the full potential of the port as a driver of trade development and economic growth. Through these areas, Durban harbour will be able to consolidate its status as a key stakeholder in the international maritime trade network, which helps in economic development and enhances more economic relationships with other nations and regions around the world.

The information offered by the participants about the transformative possibilities of Durban Harbour becoming a hub port and the resulting increase of international trade is aided by and elaborates most of the themes found in literature on maritime logistics and economic development. The purpose of this analysis is to compare these insights with the existing scholarly research to establish areas of compliance, possible gaps or contradictions.

The opinion expressed by *Participant One* of the direct influence of hub status on the volumes of trade and the positioning of South Africa as a major player in the maritime trade of the world is a reflection of the literature on the strategic significance of hub ports. Research has revealed that hub ports provide high trade volumes because of their strategic location and high connectivity, making them very important nodes in international shipping networks (Notteboom and Rodrigue, 2012a; Wilmsmeier and Notteboom, 2011). This agreeability with the literature implies that there is agreement over the possibility of hub ports to maximise the

national contribution to international trade to legitimise the importance of the development of Durban Harbour strategically.

The focus on improved connectivity by *Participant Two*, making Durban Harbour an attractive transhipping location, is in accordance with the findings that hub ports serve as a focal point between key shipping routes and, as a result, increase trade volumes and promote economic connections (Pallis et al., 2011; Wang and Ducruet, 2012). This observation reinforces the position of the literature regarding the position of hub ports in the global shipping networks and allows considering the idea that these ports can contribute substantially to a rise in the rates of trade and the enhancement of the international relations within the economic system.

The comments made by *Participant Three* about the effect of the hub status of Durban Harbour on the intra-African trade and regional integration are aligned with the existing literature on how efficient port infrastructure can contribute to the collaboration between regions (Fraser et al., 2016; Sánchez and Wilmsmeier, 2010). It is indicated in literature that hub ports may be able to induce a regional trade flow and facilitate economic integration and cooperation. This implies that it has converged with academic views on how hub ports such as Durban can spearhead economic integration in the African continent.

Greater economic advantages and a possible increase in GDP rates as indicated by *Participant Four* are well recorded in the literature. Studies have revealed that there are positive ripple effects on the economy by the greater port infrastructure and the increment in level of trade and the economy grows in other areas (Notteboom and Rodrigue, 2008; Ducruet and Notteboom, 2012). This is in line with what the participant observed highlighting the findings of the literature on the economic benefits of creating the hub ports.

The observation made by *Participant Five* regarding the competitive advantages of becoming a hub is reinforced by the literature which states that hub ports appeal more to the business because of its efficiency in operation, connectivity and the variety of services (Notteboom, 2006; Wilmsmeier and Notteboom, 2011). This is in line with the academic observations that hub ports due to their competitive locations are able to lure international shipping lines and logistics firms, which further boost trade volumes and economic relations.

The issues of sustainability and strategic partnerships, raised by *Participants Six and Seven* bring a subtle twist to the discussion, and it is in line with the current developments on the

literature. As the significance of the environmental responsibility (Acciaro et al., 2014; Woo et al., 2011) and network cooperation (Van der Lugt et al., 2014; Wang and Ducruet, 2012) in the development of ports is being acknowledged, the current focus on these features as the ways of increasing the international trade and economic relations improvement opens up potential points of further discussion in the academic literature.

Overall, the findings of the participants to the question about how the potential status of the Durban Harbour hub influences the international trade and economic interactions are widely justified by the existing body of literature that confirms the transformative nature of hub ports in the international sea logistics and economic processes. The presented perspectives reaffirmed the identified strategic advantages of the scholarly research and the significance of including sustainability and strategic partners in the development strategies. These lessons add to a more comprehensive perspective of the multilayered approach that needs to be taken to exploit the development of Durban Harbour to markets of improved international trade and economic development, which may provide avenues of future scholarly study and practice.

4.4.6.3 Sustainability and Environmental Considerations

The discussion around balancing economic development and environmental sustainability in port expansion is critical, reflecting a growing global emphasis on green practices. The insights from participants on this theme underscore the complexity of ensuring that Durban Harbour's growth as a hub port does not come at the expense of environmental integrity. This conversation reflects a broader understanding of sustainability not just as an ethical obligation but also as a strategic advantage in the competitive landscape of global ports.

Participant One addressed the foundational aspect of this balance, stating, *"Sustainable development is no longer an option but a necessity. As Durban Harbour expands, incorporating green technologies and practices from the start is crucial. This includes everything from cleaner energy sources to waste management systems that minimise environmental impact."* This perspective highlights the imperative of embedding sustainability into the core of port expansion efforts, recognising that environmental considerations must be integral to development strategies from the outset.

Expanding on the idea of sustainable infrastructure, *Participant Two* pointed out, *"Investing in renewable energy and electrification of port equipment can significantly reduce the carbon footprint of port operations. Durban Harbour's expansion presents an opportunity to set new standards in environmental sustainability for ports globally."* This insight emphasises the role of clean energy solutions in minimising operational emissions, suggesting that Durban Harbour has the potential to lead by example in the adoption of green port practices.

Participant Three highlighted the importance of community engagement: "*Balancing economic growth with environmental sustainability requires engaging with local communities and stakeholders. Understanding and addressing their environmental concerns is key to achieving a harmonious expansion that benefits everyone."* This comment underscores the necessity of a participatory approach to sustainability, where community input and concerns are integral to planning and decision-making processes.

Focusing on regulatory compliance, *Participant Four* noted, *"Complying with international environmental regulations and standards is not just about avoiding penalties; it's about demonstrating Durban Harbour's commitment to global environmental stewardship. This commitment can enhance our reputation and attract eco-conscious businesses."* This perspective frames compliance as an opportunity to showcase Durban Harbour's dedication to environmental sustainability, potentially attracting business from like-minded global partners.

Turning to the broader ecological implications, *Participant Five* suggested, *"The port must invest in comprehensive environmental impact assessments and adopt mitigation strategies that protect local ecosystems. Preserving biodiversity and water quality in and around Durban Harbour is essential for sustainable expansion."* This insight stresses the importance of understanding and mitigating the environmental impacts of port activities, emphasising the need to protect local ecosystems as part of sustainable development efforts.

On the theme of sustainable logistics, *Participant Six* remarked, *"Adopting practices like cold ironing for ships at berth and promoting the use of LNG-fueled vessels can further reduce the environmental impact. Sustainable logistics practices should be at the heart of Durban Harbour's expansion strategy."* This comment points to specific operational changes that could minimise environmental impacts, suggesting that sustainability extends beyond infrastructure to encompass every aspect of port and shipping operations.

When integrating such insights together, one thing is evident, and that is, striking a balance between economic development and environmental sustainability in the growth of Durban Harbour needs a multi-pronged approach. This would include embracing of green technologies, community, adherence to environmental standards, ecosystem protection and incorporation of sustainable logistics. Respondents have repeatedly emphasised the idea that environmental sustainability does not represent an addition to economic growth but is a fundamental element of the contemporary port expansion practices. Durban Harbour can also optimise its effects on the environment and become a pioneer in the worldwide trend of greener ports by focusing on sustainability, making it more attractive to the environmentally conscious business and making the maritime trade more sustainable.

The information given by participants about the significance of sustainability and environmental concerns in the development of Durban Harbour does not contradict the current literature on the area of port development and green practices. The purpose of this analysis is to critically analyse these insights regarding scholarly research in order to find commonality, gaps, or contradictions.

The fact that *Participant One* has focused on the idea of making a port expansion a key activity to incorporate sustainability into its foundation is also reflected in the literature, according to which sustainability is an essential aspects of contemporary port development (Notteboom and Cariou, 2009; Sanchez and Pallis, 2017). According to scholars, sustainable practices are no longer a choice but a prerequisite to the sustainability of ports in terms of long-term viability and competitiveness in the environment of environmental risks and dynamic regulations. Thus, the claims of the participant that sustainability is a requirement is consistent with academic views.

The fact that the development of Durban Harbour offers an opportunity to establish a new global standard of environmental sustainability in ports is justified by the literature that emphasises the presence of leading ports as the agents of sustainability (Monios, 2014; Pallis et al., 2011). Studies reveal that ports that embrace the use of innovative green technologies and practices tend to be the role models in the industry, which impacts the environmental standards and practices across the globe. Therefore, the perspective of the participant is consistent with the literature, the possibility of Durban Harbour taking the lead in terms of sustainability.

The focus of *Participants Three and Four* on the community involvement and compliance with the regulations is in line with the literature on a holistic approach to sustainability that considers the interests of the stakeholders and complies with the international environmental regulations (Ducruet and Notteboom, 2012; Monios, 2014). According to scholars, effective projects in port development must involve close participation and interaction with local communities to handle the issues and to make sure the development plans do not violate environmental regulations and standards. Thus, the findings of the participants are in agreement with academic suggestions on the way to a sustainable port expansion.

The idea of conducting in-depth environmental impact assessments and implementing mitigation measures to safeguard the local ecosystems as mentioned by *Participant Five* is indicative of the literature on the necessity of active environmental management during the development of ports (Song and Yeo, 2019; Zeng et al., 2018). The literature has emphasised that to promote environmental protection of port activities, it is essential to comprehend the ecological effects of ports and address them to reduce the adverse effects on biodiversity and ecology. Therefore, this perspective of the participant is consistent with the academic studies of the significance of ecological factors in sustainable port development.

Participant Six is correct in prioritising sustainable logistics, including cold ironing and new ships that use LNG as fuel, since the literature suggests these as steps towards creating sustainable shipping and port management (Notteboom and Haralambides, 2020; Van Hooydonk et al., 2018). Researchers cite sustainable logistics practices such as the use of alternative fuels, emission-cutting technologies and others, are considered to be significant in ensuring that the environmental footprint of port operations is reduced to the minimum. Hence, the focus of the participant on sustainable logistics is consistent with the academic views on the significance of green warehouse development.

In conclusion, the information that the participants shared about the importance of sustainability and environmental concerns in Durban Harbour expansion is widely reflected in the recent works on port development and environmental activities. Researchers underline the importance of sustainability in the development of ports, the possibility of the major ports to become green, the significance of the participation of the community and the maintenance of the regulatory framework, the necessity of environmental impact analysis and mitigation measures, and the introduction of sustainable logistics. Thus, the findings from the participants are consistent with existing academic views regarding the sustainable development of ports,

which indicates that there is a general agreement among the researchers that a greater focus should be directed at the environment in the process of port development.

4.4.7 Emerging Themes

The following themes emerged outside of the direct scope of the objectives, potentially revealing additional areas of interest or concern.

4.4.7.1 Technological Advancements and Digitalisation

While exploring the primary objectives outlined in the study, an emerging theme that resonated strongly across participant responses was the pivotal role of technological advancements and digitalisation in enhancing port operations and unlocking the potential for digital transformation at Durban Harbour. This theme, though tangential to the direct scope of the objectives, unveiled significant insights into how technology is perceived as a catalyst for operational excellence and strategic development within the port ecosystem.

Participant One underscored the transformative impact of technology, stating, *"Embracing digitalisation is not just an upgrade; it is a complete transformation of how we approach port operations. From blockchain for secure and transparent logistics to AI-driven predictive maintenance, the opportunities for efficiency and innovation are boundless."* This perspective highlights the comprehensive nature of digital transformation, suggesting that it encompasses various technological domains, each potentially revolutionising different facets of port operations.

Building on the discussion of specific technologies, *Participant Two* emphasised the importance of data, *"The real game-changer for ports is big data analytics. Understanding and optimising cargo flows, predicting peak times, and enhancing customer service through data-driven insights can significantly elevate Durban Harbour's operational efficiency and competitiveness."* This insight points to the strategic value of data in operational decision-making and the broader implications for enhancing the port's service offering and competitive stance.

Turning the focus to infrastructure, *Participant Three* remarked on the foundational role of technology, *"Investing in technological infrastructure is as critical as physical infrastructure. High-speed internet, IoT devices, and secure cloud storage are the backbone of a digitally advanced port. Without these, we can't hope to compete in the digital age."* This comment underscores the necessity of robust technological infrastructure as the foundation for digital transformation initiatives to be successfully built and scaled.

Participant Four highlighted the user experience: "*Technology also has the power to transform the customer experience at Durban Harbour. Online platforms for service requests, real-time cargo tracking, and digital payment systems can make the port more user-friendly and efficient for clients."* This perspective broadens the impact of digitalisation beyond operational efficiencies to include enhancements in customer service and satisfaction, indicating a holistic approach to technological integration.

Participant Five addressed the challenge of cybersecurity, *"With increased digitalisation comes the increased risk of cyber threats. Durban Harbour must invest in cutting-edge cybersecurity measures to protect operational data and maintain trust with our clients."* This insight introduces cybersecurity as a critical concern in the digital transformation journey, emphasising the need for robust security measures to safeguard against potential threats.

On the topic of workforce transformation, *Participant Six* remarked, *"Digitalisation requires a digitally skilled workforce. Training and upskilling our employees to navigate and leverage new technologies is essential for a smooth transition to more advanced, efficient port operations."* This comment highlights the human element of digital transformation, pointing to the necessity of investing in workforce development to ensure that employees are equipped to adapt to and capitalise on new technological paradigms.

Expanding on the theme of innovation, *Participant Seven* suggested, *"Durban Harbour should establish an innovation hub within the port to foster new ideas and pilot emerging technologies. Collaborating with tech start-ups and academic institutions can accelerate our digital transformation efforts."* This perspective suggests a proactive approach to innovation, advocating for collaborative spaces where new technologies can be explored and tested, thereby speeding up the port's digitalisation process.

When putting together these observations, it is clear that the theme of technological developments and digitalisation has become central, and the importance of technology in defining port operations is crucial in the context of preconditioning the success of Durban Harbour in the future. The conversations brought out the wide range of applications of technology, including operational efficiencies and data analytics, as well as improvements in customer service and cybersecurity. Furthermore, the focus on infrastructure improvement, human resources, and teamwork innovation exemplifies the holistic method needed to use all the benefits of digital transformation. Durban Harbour can not only leverage the power of technology by strategically adopting the new technological changes, but it can also reinforce its competitiveness in the industry due to the power of technology.

The information that was given by the respondents about the crucial role that technological changes and digitalisation play in the improvement of the port work at Durban Harbour coincides with the current literature on the digital transformation of ports and technological innovation. In this analysis, we will critically analyse the insights in the context of academic research, where the analysis is conducted points of convergence, gaps, or disagreements.

The idea expressed by *Participant One* that the adoption of digitalisation is a transformation of the entire operation of ports can be compared with the works focusing on the holistic character of the digital transformation of the maritime sector (Monios, 2018; Wang et al., 2019). According to scholars, digitalisation covers many technological sectors, such as blockchain, artificial intelligence (AI), big data analytics, and the Internet of Things (IoT), all of which have the potential to transform various aspects of port operations. Thus, the opinion of the participant can be seen as fitting with current academic thoughts on the magnitude and scope of digital transformation projects in ports.

The fact that *Participant Two* speaks of the strategic value of big data analytics in making port operations more efficient can be justified by the literature that provides insights into the importance of data-driven decision-making as a means of improving the efficiency and competitiveness of ports (Ng et al., 2020; Pettit et al., 2017). According to scholars, it can be helpful to use big data analytics to understand cargo flows, anticipate peak periods, and improve customer service to increase the efficiency of operations and the quality of the services. Therefore, the opinions of the participant correspond to the recommendations of the scholarly community regarding the ability of data analytics to be used in a port management context.

The statement of *Participant Three* about the importance of technological infrastructure investment can be correlated with the literature that underlines the essential role of the solid IT infrastructure in sustaining the digital transformation efforts (Notteboom and Rodrigue, 2020; Song and Yeo, 2019). According to the scholars, the infrastructure of the digitally progressive port is made up of high-speed internet, IoT devices, and secure cloud storage, which all contribute to integrating the digital technologies smoothly and managing data effectively. Thus, the subjective opinion of the participant is consistent with the academic attitudes toward the need to invest in technological infrastructure as a pre-condition to effective digitalisation actions.

Participant Four's idea to use technology to improve the customer experience in the port is in line with the literature that portrays the need to customise the digitalisation process at ports (Monios, 2019; Notteboom et al., 2020). It is argued by the scholars that online service requests, cargo tracking in real-time, and digital payment systems can enhance both user satisfaction levels and the efficiency of the port and increase competitiveness. Thus, the perspective of the participant is consistent with the academic guidelines to use technology to improve customer service at ports.

The fact that *Participant Five* identified cybersecurity as a crucial issue in the digital transformation process is consistent with the literature that has identified the cybersecurity risks presented by the growing digitalisation of ports (Sanchez and Pallis, 2019; Wang et al., 2021). Researchers believe that the more ports are becoming digitalised, the more vulnerable they become to cybercrime, and this is why they should ensure that their cybersecurity is high to safeguard the data they are operating with and to preserve trust among various stakeholders. Thus, the opinion of the participant is in line with the academic attitudes towards the significance of cybersecurity in digitalisation of ports.

The attention of the *Participant Six* to the development of the workforce to improve their digital skills is also consistent with the literature suggesting the significance of upskilling and reskilling of port employees in the digital environment (Wilmsmeier and Monios, 2019; Xu et al., 2020). The proponents of digitalisation state that the process needs a digitally skilled labour force that can operate and use emerging technologies to enhance innovation and efficiency in port activities. Consequently, the opinion of the participant is in line with the academic advice of investing in workforce to enable effective digital transformation.

The fact that *Participant Seven* proposes establishing an innovation hub on the Durban Harbour premises is consistent with the existing literature that supports the idea of collaborative areas where new technologies will be experimented and tried (Notteboom et al., 2019; Sanchez and Pallis, 2018). People believe that the partnership with the technological start-ups and academic institutions can promote the acceleration of the process of digital transformation in the ports through the development of the innovation and knowledge sharing. Thus, the opinion of the participant is in line with the positions of scholars on the significance of collaborative innovation that can be used to stimulate the process of port digitalisation.

Overall, the information shared by the respondents about the crucial importance of technological growth and digitalisation in boosting the operations of Durban Harbour can be considered similar to the latest studies on the digital transformation of ports and technological innovations. Researchers focus on the holistic character of the digital transformation efforts; the strategic significance of data analytic;, the constructive role of technological infrastructure; the necessity to develop the customer experience; cybersecurity issues; the necessity to develop the workforce; and the advantages of the joint innovation. Thus, the participant findings are consistent with current academic views on the importance of technology in enhancing the process of port digitalisation.

4.4.7.2 Stakeholder Collaboration and Partnerships

As the conversations unfolded, the importance of stakeholder collaboration and partnerships emerged as a significant theme, underscoring the consensus among participants on the critical role of synergistic efforts in driving successful port development. This theme reflects a broad understanding that the evolution of Durban Harbour into a premier hub port necessitates coordinated action and a shared vision among all port stakeholders, including government bodies, industry players, and the wider community.

Participant One articulated the foundational need for collaboration: "*True progress in port development is only achievable when there's a concerted effort among all stakeholders. Government support in facilitating regulatory processes, industry expertise, and community engagement form the bedrock of sustainable port expansion."* This perspective highlights the multifaceted nature of port development, emphasising the need for a holistic approach that leverages the strengths and insights of various stakeholders to achieve common goals.

Building on this, *Participant Two* emphasised the strategic aspect, *"Partnerships between the port authority and shipping lines, logistics companies, and technology providers can drive innovation and efficiency in port operations. Such alliances are essential for keeping Durban Harbour at the cutting edge of maritime logistics."* This insight points to the practical benefits of collaboration, suggesting that strategic partnerships can catalyse innovation and operational improvements, thereby enhancing the port's competitive position.

Participant Three focused on the community dimension, remarking, *"Engaging local communities in the port's development plans ensures social license to operate and can also unlock insights into sustainable development practices. Community involvement is key to identifying and addressing social and environmental concerns associated with port expansion."* This comment underscores the importance of community engagement in the development process, highlighting the value of local insights in fostering sustainable and socially responsible port expansion.

Turning to the role of academia and research, *Participant Four* noted, *"Collaboration with academic institutions and research organizations can enrich port development with cutting-edge knowledge and innovations. These partnerships can lead to developing new technologies and practices that enhance port efficiency and sustainability."* This perspective broadens the scope of collaboration to include knowledge exchange and innovation, pointing to the potential for academic partnerships to contribute to the port's development objectives.

Addressing the financial aspect, *Participant Five* stated, *"Joint ventures and financial partnerships with investors can provide the necessary capital for large-scale port infrastructure projects. These collaborations can also bring in financial expertise and risk management strategies that are crucial for the successful implementation of development initiatives."* This insight highlights the economic dimensions of collaboration, emphasising the role of financial partnerships in securing the resources and expertise needed for port expansion and modernisation.

On the theme of regulatory alignment, *Participant Six* remarked, *"Effective collaboration between the port authority and regulatory agencies can streamline permitting processes and ensure compliance with environmental and safety standards. This regulatory alignment facilitates smooth and timely port development projects."* This comment points to the

importance of regulatory cooperation in overcoming bureaucratic hurdles, suggesting that a collaborative approach can lead to more efficient project approvals and compliance processes.

Expanding on the importance of global networks, *Participant Seven* suggested, *"Durban Harbour should actively seek to participate in global port and maritime organisations. Such affiliations can foster international collaborations, opening doors to best practices, global standards, and opportunities for mutual growth."* This perspective highlights the strategic value of engaging with international networks, suggesting that global collaborations can enhance the port's capabilities and stature on the world stage.

When all these insights are synthesised, the theme of stakeholder collaboration and partnership can be identified as one of the key pillars of successful development of Durban Harbour. The respondents all emphasised the various advantages of collaboration, which include access to government support and industry knowledge, collaboration with local people and innovation through academic collaborations. Also, the insights indicate the significance of having financial partnerships to fund infrastructure projects, regulatory partnerships to have effective implementation of projects, and international partnerships to engage the world. These views highlight the fact that multilateral synergies are necessary to achieve the potential of the Durban Harbour as a leading harbour and to make it a hub of innovation, sustainability and competitiveness in the global maritime sector.

The focus on stakeholder collaboration and partnerships as the key factors in the effective development of Durban Harbour is consistent with the recent literature on the port governance, involvement of stakeholders, and collaborations in the maritime sector. The given analysis is devoted to the critical analysis of the insights offered by the participants in comparison with scholarly research, determining the points of correspondence, possible gaps or contradictions.

The statement by *Participant One* about the inherent necessity of collaboration between stakeholders is similar to the port governance literature, which stipulates the significance of coordinated activity of governmental agencies, port authorities, industry participants, and the local population (Tongzon, 2018; Wilmsmeier and Monios, 2018). According to scholarly research, sustainable development of ports needs a holistic approach involving the harmonisation of the interests and views of different stakeholders in line with meeting common interests. Hence, the opinion expressed by *Participant One* is consistent with current academic opinions on the need of collaborative governance systems in the development of ports.

The focus on the strategic partnerships by *Participant Two* as the means of moving innovation and efficiency in the any port operation may be proved by literature that supports collaborative practice in maritime industry (Ferrari and Parola, 2020; Notteboom and Pallis, 2017). The researchers believe that information sharing, innovation and operational practices can be developed through the collaboration of port authorities, shipping lines, logistics and technology providers, and ultimately, contribute to the competitiveness and robustness of ports. Thus, the opinion expressed by the *Participant Two* supports the academic suggestions regarding the idea of using strategic partnerships as a way to promote port innovation.

The attention of *Participant Three* to the inclusion of the local communities in the development plans of port development is consistent with the literature on the need to include local communities to obtain a social license to operate (Wan et al., 2019; Brooks et al., 2020). The evidence of science supports the importance of consulting with the local stakeholders about identifying and responding to the social and environmental issues related to the port expansion and developing port expansion in a sustainable and socially responsible way. Hence, the perspective of the *Participant Three* is consistent with the academic vision of the importance of community involvement in the process of port planning.

The idea by *Participant Four* to engage academic institutions and research organisations is consistent with the literature on knowledge exchange and innovation partnerships, which are recommended to develop a port (Gouvernal and Notteboom, 2020; Wilmsmeier and Monios, 2019). According to scholars, academic relations can deepen the port development projects with innovative research, technological advances, and best practices to increase the port efficiency, sustainability, and competitiveness. Thus, the opinion of *Participant Four* is consistent with the academic suggestions to utilise academic partnerships as the means of stimulating port innovation.

The interest of the *Participant Five* in joint ventures and financial partnerships in the funding of port infrastructure projects are consistent with the literature on the significance of financial partnerships in the development of ports (Gheorghiu et al., 2018; Wang and Ducruet, 2019). Researchers believe that a large-scale infrastructure investment requires a financial backing through financial institutions and investors that could give the capital, know-how and risk management plans they require to achieve the successful execution of port development projects. Thus, the opinion of *Participant Five* correlates with the academic approaches to the meaning of financial partnerships in port financing.

The fact that *Participant Six* sees the significance of regulatory congruence between the port authority and regulatory bodies is consistent with the literature on the necessity of streamlined permitting procedures and collaboration between regulatory bodies in the context of port development (Wan et al., 2018; Notteboom and Rodrigue, 2019). According to scholars, regulatory alignment and cooperation are the key to overcoming the bureaucratic barrier, making sure that the environmental and safety standards are followed, and the project can be implemented as smooth and timely as possible. Thus, the perspective of *Participant Six* is consistent with the academic advice on the regulatory cooperation in port governance.

The idea proposed by *Participant Seven* to engage global port and maritime organisations actively is also in line with the literature that suggests the importance of international partnerships and involvement in the maritime industry (Wilmsmeier et al., 2019; Brooks et al., 2020). The scholars do state that through global networks, and keeping in touch with international networks allows for the sharing of the know-how, capacity building, and adoption of best practice, which in turn creates enhanced port capabilities and competitiveness in the international arena. Consequently, the opinion of the *Participant Seven* corresponds to the academic assessments of the strategic importance of international alliance in the development of ports.

Overall, the information given by the participants about the significance of stakeholder collaboration and partnership in the development of Durban Harbour are closely related to the recent literature on the port governance, stakeholder engagement, and collaboration practices in the maritime sector. Researchers state that sustainable and competitive development of ports requires coordinated actions of different stakeholders such as governmental institutions, players in the industry, local communities, academia, investors, and international organisations. Thus, the insights of the participants correlate with the existing academic views on the importance of collaborative governance systems, strategic alliance, community, academic, financial, regulatory, and international interactions in the process of facilitating the success of port development projects.

4.4.7.3 Community Impact and Social Responsibility

The discussions around community impact and social responsibility brought to light the nuanced considerations accompanying the expansion of Durban Harbour. This theme

highlights the participants' recognition of the port's duty not only to its direct stakeholders but also to the broader community and environment. Their insights reveal a deep understanding of the importance of sustainable and responsible development practices.

Participant One expressed the foundational concern for community well-being, stating, *"The expansion of Durban Harbour must be pursued with a clear commitment to the local community's welfare. It's imperative to ensure that development projects do not displace local populations or harm their livelihoods, but instead contribute positively to the community's socio-economic development."* This perspective underscores the need for port expansion efforts to be inclusive and beneficial to the local community, ensuring that development does not come at the cost of social displacement or economic hardship for residents.

Building on the importance of environmental stewardship, *Participant Two* emphasised the ecological considerations, *"Sustainable expansion is not just about economic growth; it's about preserving our natural heritage for future generations. Every effort must be made to minimise the environmental footprint of port operations, incorporating green technologies and practices that protect our coastal and marine ecosystems."* This insight highlights the critical balance between development and environmental protection, advocating for integrating sustainable practices that safeguard ecological health.

Addressing the economic impact, *Participant Three* remarked on the potential for job creation, *"One of the most direct ways the port can contribute to social responsibility is through creating employment opportunities. The expansion should focus on not just any jobs, but quality jobs that offer fair wages and conditions, contributing to reducing local unemployment rates and improving living standards."* This comment points to the importance of ensuring that the economic benefits of port expansion translate into tangible improvements in the quality of life for the local community.

Regarding social infrastructure, *Participant Four* noted, *"Investing in social infrastructure such as education, healthcare, and public spaces as part of the port expansion projects can leave a lasting positive legacy in the community. These investments demonstrate a commitment to the holistic development of the harbour's surrounding areas."* This perspective broadens the scope of social responsibility to include contributions to the community's overall well-being and quality of life through enhanced public services and facilities.

Focusing on stakeholder engagement, *Participant Five* stated, *"Effective communication and engagement with the community and other stakeholders are key to responsible port development. Open dialogues can help identify community needs and concerns, ensuring that the expansion aligns with local interests and contributes to sustainable development goals."* This insight underscores the value of participatory approaches in development planning, suggesting that active engagement with the community can lead to more inclusive and accepted development outcomes.

On the corporate social responsibility (CSR) theme, *Participant Six* remarked, *"Durban Harbour's expansion projects should be framed within a broader CSR strategy that encompasses not just environmental initiatives, but also social programmes aimed at uplifting the local community. This could include education scholarships, community health initiatives, and support for local businesses."* This comment extends the concept of social responsibility to include proactive CSR initiatives that directly contribute to community welfare and economic empowerment.

Highlighting the importance of transparency, *Participant Seven* suggested, *"Maintaining transparency about the expansion's impacts, both positive and negative, is crucial for building trust with the community. Open reporting and accountability mechanisms can help manage expectations and ensure the port's development is seen as a shared community project."* This perspective emphasises the need for open communication and accountability in managing community relations, suggesting that transparency is key to fostering trust and collaboration between the port and its surrounding community.

When summarising these findings, the concept of community impact and social responsibility emerges as a key issue in the development of the Durban Harbour. According to the participants, the necessity of the sustainable development practices with a stronger emphasis on the welfare of the local community and the environment was clearly expressed. The lessons, starting with the allocation of the economic benefits of port expansion so that they are fairly distributed, and including investments in social infrastructure and having a meaningful discussion with the community, reflect an overall take on social responsibility. The focus on the environmental stewardship and CSR efforts hint at the expanded role of Durban Harbour plays in the development of sustainable business and the creation of a positive legacy of the

efforts that will be left behind by the future generations. Following these considerations enables Durban Harbour to increase its social and environmental impact, as the expansion efforts of the business should be reshaped in accordance with the values of responsibility and sustainable development.

The debate on community impact and social responsibility in the Durban Harbour expansion plan indicates that the developers are well aware of the delicate implications and moral requirements surrounding the development of a port. The perspectives of the respondents highlight the need to focus on the well-being of the local population, environmental conservation, and the promotion of sustainable development procedures. The analysis will provide a critical analysis of these findings against the recent literature on port governance, corporate social responsibility (CSR), stakeholder engagement, and sustainable development.

The focus of the *Participant One* on the welfare of the local community corresponds to the literature emphasising the role of community involvement and social inclusion in the development project of a port (Brooks et al., 2020; Wan et al., 2018). The academic literature highlights the importance of incorporating those living around the port areas in the planning process that takes into consideration the interests and concerns of the locals in ensuring that the port authorities do not cause social displacement and alleviate the adverse effects on people living around the areas. Thus, the opinion of *Participant One* can be considered as echoing the current academic thinking on the primacy goal of the community well-being in port development.

The focus on sustainable operations by *Participant Two* with the aim of reducing the environmental footprint of port operations, is in line with the literature that highlights the need to be an environmental steward in developing ports (Notteboom and Rodrigue, 2019; Wilmsmeier and Monios, 2019). According to the scholars, ports have a duty to ensure that coastal and marine ecosystems are preserved by the use of green technologies, the prevention of pollution, and the preservation of habitats. Thus, the opinion of the *Participant Two* is in line with the existing academic views on the significance of the environmental considerations in the port expansion projects.

The awareness of *Participant Three* about the role of port expansion in generating quality job opportunities is in line with the literature that port development may have socio-economic advantages to the community (Brooks et al., 2020; Gouvernal and Notteboom, 2020).

Researchers place emphasis on fair economic development and employment that would help in social inclusion and would enhance the quality of life of the local people. Thus, the opinion of *Participant Three* echoes the existing academic positions regarding the significance of making sure that economic gains are reflected in real enhancing the community welfare.

The idea proposed by the *Participant Four* of investing in social infrastructure during the port expansion projects is compatible with the literature suggesting holistic views of the social responsibility in the port development (Wan et al., 2019; Ferraris and Parola, 2020). According to the scholars, the port authorities need to think about the overall socio-economic effects of their operation and contribute to the development of the community by investing in community service, education, medical facilities, and leisure centres. Thus, the opinion of *Participant Four* can be seen as corresponding to the existing academic trends which focus on the significance of investment in social infrastructure within the port-led development programs.

The focus of *Participant Five* on effective communication and the community-focused engagement corresponds to the existing literature that suggests that the participative community-related approach should be established in the development of the project concerning the port (Brooks et al., 2020; Notteboom and Pallis, 2017). According to the scholars, trust and the effective management of expectations and other problems as well as increased acceptance of port expansion efforts in the community can be achieved through open communication and their involvement in the decision-making process. Thus, the opinion held by *Participant Five* is in tune with the existing academic opinions on the significance of transparent and participatory governance in port development.

The idea expressed by *Participant Six* to present the projects of port expansion as a part of a larger CSR policy project is consistent with the literature on the significance of corporate citizenship and community investment in port development (Wilmsmeier and Monios, 2018; Gouvernal and Notteboom, 2020). Experts believe that ports ought not merely to be compliant with regulations but should be willing to undertake CSR activities that aim at relieving the social, environmental, and economic difficulties of local communities. Thus, the opinion expressed by *Participant Six* is similar to the current academic interpretations of the role of ports as responsible corporate citizens.

The argument of *Participant Seven* on transparency and accountability in relation to managing community relationship is consistent with the literature on the significance of open

communication and accountability systems in port management (Brooks et al., 2020; Wan et al., 2018). Researchers believe that trust in a decision made by port authorities can be ensured through transparent reporting, consultation of stakeholders, and grievance mechanisms. Thus, the opinions of *Participant Seven* are close to the current academic attitudes to the importance of transparency and accountability as the means of supporting positive relations in the community.

Overall, the experiences expressed by those who participated in the discussion of the topic of community impact and social responsibility in the growth of Durban Harbour can be closely related to recent research on port governance, the idea of corporate social responsibility, the involvement of the stakeholders, and sustainable development. Researchers note that community well-being, environmental stewardship, economic inclusivity, and social infrastructure investment, stakeholder engagement, CSR initiatives, transparency, and accountability are the priorities of port development projects. As such, the stated opinions of the participants agree with the current academic views on the moral requirements and ethical practices relating to responsible and sustainable port development.

4.6 Chapter summary

In summary, the lessons gained in the discussions on Durban Harbour's evolution into a hub port abound with the complexity of the port development issue and interrelation of the different themes. Among them are economic development, technological progress, collaboration with the stakeholders, sustainability, and social responsibility. The views of the participants showed that there was a strong agreement on the need to embrace holistic practices that would strike a balance between the economic and environmental and social issues. The objectives are:

i. To test the possibility and development opportunities of improving the container handling capacity, infrastructure and operational efficiency improvement of Durban Harbour towards positioning the port as a hub port in the Southern Hemisphere, by taking advantage of the economic benefits of being a hub port.
ii. To determine how Durban Harbour port is located along the major trade routes within the Southern Hemisphere and to determine how the port has impacted the regional trade patterns.
iii. To determine the inhibitors and evaluate the levels of investment, growth opportunities, shipping requirements, political environment and trading blocks.

iv. To present proposals of developing Durban Harbour as a hub port, with emphasis on enhancing infrastructure, efficiency in operations, as well as lure shipping lines and logistics service providers.

v. To study the economic effect of the Durban Harbour port and its effect on the region and to observe how this transformation would increase trade in the region and the international trade. This change cannot be simply discussed as a local or regional concern but it is central in the scheme of international trade and commerce.

Their observations showed the radical potential of strategic port improvements, which underpin the key role of operational excellence, innovations, and alliances in supporting sustainable growth and competitiveness. Combining these insights and aligning them with the current literature on the topic of port governance and development, it is clear that the process of reaching the goals established for the Durban Harbour, will require a holistic approach that incorporates multiple viewpoints, involves all the stakeholders and focuses on the long-term sustainability of the matter. In the future, port authorities and stakeholders will have to pay attention to these lessons and work in unison to make Durban Harbour a hub port, one that will lead to economic and social prosperity, environmental and social well-being in the area.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter is a summary of the findings on a thorough examination of how Durban Harbour is likely to become a major hub port in the south hemisphere. The research has addressed issues that are important to this change such as operational challenges, infrastructural conditions, the economic impacts of port development, the central role of innovative technology in port transformations, and the need to develop partnership relations between all the parties involved.

The objective of the research is the viability and the developmental possibilities of improving the container handling capacity, the infrastructure, and the operational efficiency enhancement of Durban Harbour with the aim of positioning the port as a hub port in the Southern Hemisphere with the economic advantages of the place becoming a hub port. The strategic location of Durban Harbour port along the key trade routes in the Southern Hemisphere is determined and its impact on the trade patterns in the region is examined. Inhibitors are identified and investment, expansion potentials, shipping demand, political climate and trade blocks are determined. The development of Durban Harbour as a hub port, means paying attention to the enhancement of the infrastructure, the efficiency of operations and ways of attracting shipping lines and logistics service providers. The economic contribution of the Durban Harbour port is investigated and how it would affect the region is measured to analyse how this change would help the region and the international trade. This is not a local or regional issue but it forms a critical point in the larger international trade and commerce plan.

The chapter revises the objectives of the research, describes how all the objectives were met and provides a summary of the main findings. It is also concluded with specific recommendations that would help policy makers, port managers and industry players to guide the evolution of Durban Harbour towards its vision statement of becoming one of the largest container port hubs.

5.2 How Objectives Were Met

In this section, the researcher will present in detail how the research objectives were responded to:

Objective 1: To assess the position of the Durban Harbour port on the major trade routes in the Southern Hemisphere, and its influence on regional trade patterns

The objective of assessing Durban Harbour's position on trade routes aimed to uncover the strategic significance of its location within the Southern Hemisphere's trade network and its influence on regional trade patterns was done by conducting an intensive literature review. This formed the basis of further interview sessions with the key players in the industry. These discussions were guided by the development of a detailed interview schedule. The transcripts of the interviews were thoroughly analysed alongside the discoveries of the literature review in order to concentrate on the physical location of the port and its relevance in enabling commerce between various locations.

The paper utilised several research methods, such as the analysis of trade statistics and the study of the trade routes by analysing maritime transit, and study of past trade. These methods aided in plotting the main shipping routes and the contribution of the port in enabling trade among regions. Using the available literature on maritime studies, including the works of Notteboom and Rodrigue (2005) and consulting senior researchers in the industry, the research has offered an overview of how the Durban Harbour can be linked to the major trade routes and the strategic role it can play in the world maritime business.

According to the above findings, the strategic location of the Durban Harbour is an inseparable part of its potential of becoming a major port in terms of container hubs. The port is strategically located at the intersection of major shipping routes and acts as a key point of trade between the West and the East and among the African states. This favourable location makes it very effective in serving as a gateway to international markets, which makes it even more important to the dynamics of regional trade.

The full potential of the port has not yet been exploited because of the existing infrastructural and operational constraints. This highlights the importance of making specific investments to take advantage of its geographical strength and improve its presence in the global trade. Strategic investments in port infrastructure have been emphasised by other authors like Lam and Notteboom (2014) to make the most out of such geographical advantages.

Some of the advantages of Durban Harbour location that were mentioned by the study participants were that it offers shorter shipping times and costs along the routes between Asia, Africa and South America and, therefore, is a good alternative for global shipping lines. They, however, also indicated that they should make improvements on berth depth, terminal capacity, as well as logistical processes to maximise such benefits.

In the case of the port authorities, the most important thing to do is to invest in the improvements of the infrastructure, e.g. deepening the berths, increasing the terminal capacities, etc. Shipping lines would have to take Durban Harbour's strategic location into account when considering their routing strategy by taking advantage of its possibilities to minimise transit time and costs. The financial institutions and banks can assist in this by offering funding towards the required infrastructure projects with the purpose of having a payback on the investment by being able to generate more activities in the port and economic growth within the region.

Objective 2: To identify the inhibitors and assess the levels of investment, expansion potentials, shipping demand, political climate and trade blocks

This objective aimed to identify the inhibitors to Durban Harbour's development and assess its investment potential. Extensive research was carried out, and it involved conducting a detailed literature review, analysing company documents, and drawing up an interview schedule with selected participants. The interviews with the major stakeholders were held, transcribed and analysed with the literature and company documents.

Those factors that hamper the growth of the port were to be discovered and the possibilities of strategic investments were to be evaluated. Some of the main issues that were addressed in the study included infrastructure constraints, the trend in shipping demand, political stability, and the influence of trade blocs on port performance. A comprehensive picture of the opportunities and challenges of the port was acquired by collecting information about port authorities, industry reports and conducting interviews with the stakeholders.

The study identified a number of major obstacles in the development of Durban Harbour. These included small berth depths, inadequate terminal space and obsolete logistical procedures which generate bottlenecks that slow down the capacity of the port to accept large vessels as well as handle the cargo efficiently. As an illustration, Notteboom and Rodrigue (2005) pointed

out the importance of modernising port infrastructure to make it more efficient and with high capacity.

Opportunities for investment, especially in areas such as infrastructural and technological upgrades, were found to be significant in the study. The only way to overcome these limitations is by making strategic investments in deepening berths, increasing capacity in terminals and implementing cutting-edge digital technologies. Similar results were expressed in the literature review and such authors as Lam and Notteboom (2014) discussed the role of technological advancements in the functioning of ports.

The stakeholder interviews identified the necessity of improving the infrastructure to correspond with current global standards. It was also observed that political stability and favourable trade policies hold the key to attracting foreign direct investment (FDI) and sustainable growth. The political situation is relatively stable, though there needs to be constant development in terms of regulatory frameworks to make functioning and investing easier.

The port authorities should primarily consider investing in infrastructure, particularly by deepening the berths and building up the terminal capacities to accommodate the bigger ships and to ensure efficiency. Shipping companies need to utilise the potential of Durban Harbour in their routing decision by using it as a strategic port in their routes, as it has strategic advantages. The policymakers should take care to have a steady and favourable political environment that promotes investment and trade. Financial institutions need to seek opportunities to finance infrastructural and technological improvements as it is a long-term project to have a modernised and efficient port. With these inhibitors being overcome by making targeted investments and by friendly policies, Durban Harbour will be able to realise its potential thus making it a more competitive and attractive port to global shipping lines.

Objective 3: To make proposals for developing Durban Harbour as a hub port, focusing on improving infrastructure, operational efficiency, and attraction of shipping lines and logistics service providers.

In an attempt to suggest the development of Durban Harbour as a hub port, the study came up with actionable recommendations, in reviewing pertinent literature, consultation with the stakeholders and looking at best practices within the industry. The proposals were centred on such important spheres as infrastructure improvement, increasing the efficiency of its

functioning, and the mechanisms of attracting shipping lines and logistics service providers. The stakeholder consultations provided inputs on the realistic needs and challenges, and industry best practices of successful models that can be applied to Durban Harbour. The integrative practice was used to make sure that the recommendations were not only evidence-based but also practical.

The results of this goal highlighted the need to provide the infrastructure and digitalisation to make Durban Harbour one of the most dominant maritime ports. The depth and breadth of berths must be increased to service bigger ships and the number of terminals increased to accommodate more traffic. The latest technologies like automated container handling equipment and real time tracking systems must be incorporated. Furthermore, the development of strong stakeholder relations and establishment of strategic relationships with shipping companies and logistics suppliers were also mentioned as important elements of the port competitiveness. The research was able to conclude that such projects should be effectively implemented to make Durban Harbour a great hub port in the Southern Hemisphere.

Objective 4: To examine the economic impact of the Durban Harbour port and its impact on the region and to examine how this transformation would contribute to regional and international trade

The economic contribution of the Durban Harbour was analysed in detail and the conversion of the port into a hub was assessed. This entailed an evaluation of the contribution of the port to the regional economy, the potential of creating employment and its contribution to regional and international trade. The paper employed economic modelling, interviews with stakeholders and an examination of available economic data to gain an in-depth insight on the economic footprint of the port. This was a multi-faceted strategy which provided a good assessment of the direct and indirect economic benefits of the development of the port.

The economic impact evaluation was also important since, to make informed strategic decisions, it is important to know the overall economic effects of making Durban Harbour a hub port. The stakeholders can plan better on sustainable development by assessing that the development of the port will catalyse economic growth, investment, and trade. In the evaluation process, the analysis of such major indicators as the contribution to GDP, job creation, and trade volumes growth was conducted to determine the potential impact of the port.

As analysis has shown, the development of Durban Harbour as a hub port can considerably contribute to an increase in the volumes of the trade and the economic development of the area. The opening up of the port will provide a number of employment opportunities, not only in the port itself but also in other related sectors such as manufacturing, logistics and services. The increased capacity and efficiency would improve international trade relations, which would make Durban a major entry point to international trade.

The findings of the current study are supported by the work of such authors as Rodrigue (2020) and Brooks (2017), who focus on identifying the transformative economic effect of port development. This research has demonstrated that the economic returns are considerable, but to realise such returns, there must be effective investments and long term planning to make sure that growth is sustainable, not exclusive.

Port authorities and policy makers must realise that infrastructure and technology are key strategic investments that are necessary to achieve the economic value of Durban Harbour and turn it into into a hub port. It is also important to plan and take into account environmental and social concerns in order to have an inclusive and sustainable growth.

For the stakeholders and investors in the industry, investment in Durban Harbour is an important opportunity to take advantage of the higher trade volumes and growth in the economy. Teamwork aimed at increasing port capacity and efficiency can pay off in a significant way, not only in financial benefits, but also when it comes to economic progress in general.

Shipping lines and logistics service providers will reap the rewards of the new and better capacity of Durban Harbour and its strategic location can help achieve better operational efficiencies and time and costs savings in shipping. The incorporation of Durban Harbour in the routing can also be used to give competitive advantages in international trade.

By responding to these suggestions, Durban Harbour will be able to make the best of its economic contribution to the development of the region and its dominance in the global shipping market.

5.3 Summary of Key Findings

5.3.1 Strategic Geographical Advantage

Durban Harbour's strategic location along major global trade routes positions it as a crucial gateway between the East and the West, while also serving intra-African trade. This geographical advantage enhances its potential as a major container hub port. However, the port's full potential remains untapped due to existing infrastructural and operational limitations. To fully leverage its strategic position, significant investments are needed to upgrade the port's infrastructure, a process which will include deepening berths and expanding terminal capacities. Addressing these limitations is essential to accommodate larger vessels and increase the efficiency of cargo handling operations, thereby maximising the port's geographical advantage.

5.3.2 Operational and Infrastructural Challenges

Durban Harbour faces several operational and infrastructural challenges that hinder its development as a hub port. These challenges include limited berth depth, insufficient terminal space, and outdated logistical processes. These constraints create bottlenecks, impeding the port's ability to handle larger vessels and efficiently manage cargo flows. Overcoming these hurdles requires strategic investments in modernising infrastructure and adopting advanced technologies such as automated container handling and real-time tracking systems. These improvements are critical for enhancing operational efficiency and ensuring that the port can meet the demands of contemporary maritime logistics.

5.3.3 Economic Impact and Trade Enhancement

Transforming Durban Harbour into a hub port promises substantial economic benefits, including GDP growth, job creation, and enhanced international trade relations. The port's development is expected to boost trade volumes, attract investment, and stimulate economic activity across various sectors such as manufacturing, logistics, and services. However, it is crucial to balance these economic objectives with commitments to environmental stewardship and social equity. Integrating sustainable development practices and ensuring that growth is inclusive will help harmonise economic ambitions with broader societal and ecological goals, thereby fostering long-term regional prosperity.

5.3.4 Technological Advancements and Digitalisation:

Durban Harbour's digital transformation is critical for enhancing operational efficiency and strategic decision-making. Investments in advanced digital technologies, such as blockchain for secure transactions, AI for predictive analytics, and IoT for real-time monitoring, are essential. These technologies can streamline port operations, improve cargo handling, and provide actionable insights for better management. Additionally, robust cybersecurity measures are necessary to protect data integrity and ensure the continuity of operations. Embracing digitalisation will position Durban Harbour as a forward-thinking, competitive port in the global maritime industry.

5.3.5 Stakeholder Collaboration and Partnerships

Successful development of Durban Harbour into a hub port requires robust collaboration among all stakeholders, including government bodies, industry players, local communities, and international partners. Such partnerships can drive innovation, streamline regulatory processes, and unlock investment opportunities. Engaging a broad spectrum of stakeholders ensures that development efforts are well-coordinated and aligned with all parties' interests. Strategic alliances with shipping lines, logistics companies, and technology providers are exceptionally vital for enhancing operational efficiencies and fostering a culture of continuous improvement.

5.3.5 Sustainability and Social Responsibility

Integrating sustainability and social responsibility into Durban Harbour’s expansion strategy is crucial for ensuring long-term viability. This involves adopting green technologies, such as electric port vehicles and advanced waste management systems, to minimise the environmental impact. Active engagement with local communities ensures that development projects address social and environmental concerns, fostering inclusive growth. Implementing comprehensive CSR initiatives, such as educational programmes and support for local businesses, further demonstrates the port’s commitment to social responsibility. These efforts position Durban Harbour as a leader in ethical and sustainable port development, aligning with global environmental consciousness and corporate citizenship trends.

5.4 Recommendations

5.4.1 Infrastructural Investments

Enhancing Durban Harbour's infrastructure is crucial for its development as a premier hub port. This includes deepening berths to accommodate larger vessels, expanding terminal capacity to handle increased cargo volumes, and improving hinterland connectivity through better rail, road, and pipeline systems. Such upgrades will optimise cargo flow, reduce turnaround times, and increase the port's overall capacity. Strategic investments guided by detailed feasibility studies should prioritise projects that deliver the highest impact on operational efficiency. This comprehensive approach to infrastructure development is essential for attracting major shipping lines and positioning Durban Harbour as a key node in the global shipping network.

5.4.2 Digital Transformation

Implementing advanced digital technologies is imperative for enhancing operational efficiency at Durban Harbour. This involves deploying data analytics and IoT solutions to streamline port operations, improve cargo handling processes, and enable proactive decision-making based on real-time data. Investing in robust technological infrastructure, such as high-speed connectivity and secure cloud storage, is essential. Additionally, comprehensive workforce development programmes should be introduced to equip port staff with the necessary skills to effectively utilise these technologies. Embracing digital transformation will enhance the port's competitiveness, operational excellence, and readiness for future challenges.

5.4.3 Economic and Strategic Planning

Developing a comprehensive economic strategy is vital for enhancing Durban Harbour's export capabilities and attracting Foreign Direct Investment (FDI). This strategy should foster robust trade relations, enhance the port's attractiveness to shipping lines through operational efficiencies, and engage in diplomatic and trade missions to open new markets. Aligning port development with national economic goals will ensure that the harbour contributes significantly to GDP growth, job creation, and economic diversification. A holistic approach involving collaboration with industry experts, government bodies, and international trade partners is essential for positioning Durban Harbour as a leading player in the global maritime industry.

5.4.4 Sustainability Integration

Integrating sustainability into every facet of Durban Harbour's development is paramount. This includes adopting green technologies such as solar-powered lighting, electric port vehicles, and advanced waste management systems to reduce the environmental footprint of port operations. Conducting comprehensive environmental impact assessments for all significant projects ensures that potential adverse impacts are identified and mitigated. Engaging local communities in development plans ensures that social and environmental objectives are met. Positioning Durban Harbour as a leader in sustainable port development will set the benchmark for environmental stewardship and ensure that growth is harmonious with the well-being of surrounding ecosystems and communities.

5.4.5 Stakeholder Engagement

Building solid relationships with all stakeholders is essential for the cohesive development of Durban Harbour. This involves creating ongoing dialogue and collaboration platforms between port authorities, government bodies, private sector players, and the community. Such engagement ensures transparency and inclusivity in decision-making processes, facilitating the formation of strategic partnerships and joint ventures that leverage collective resources and expertise. Regular stakeholder meetings, community forums, and digital communication channels are crucial for fostering trust and cooperation. This collaborative approach will align port development with broader economic and social objectives, ensuring integrated growth.

5.4.6 Workforce Development

Investing in comprehensive training and upskilling programmes for port staff is critical for the modernisation and sustainability of Durban Harbour. These programmes should cover digital literacy, the operation of advanced port machinery, and sustainability practices. Emphasising digital competencies is particularly important given the focus on digital transformation. Training in green technologies and sustainable practices will ensure the workforce can operate and maintain environmentally friendly systems effectively. By enhancing the skills and knowledge of its workforce, Durban Harbour can improve operational capacity and efficiency and foster a culture of innovation and continuous improvement.

5.4.7 Regulatory and Policy Support

Advocating for regulatory reforms is crucial for creating an enabling environment for Durban Harbour's operations and development. It is essential to simplify approval processes for

infrastructure projects and ensure they are expedited without compromising on standards. Policies incentivising private sector investment, such as tax incentives and public-private partnership frameworks, can mobilise the necessary capital and expertise for port expansion. Streamlining customs and tariff regulations will enhance trade facilitation. Aligning the regulatory and policy environment with strategic objectives will enhance Durban Harbour's attractiveness to investors, shipping lines, and logistics service providers, accelerating its transformation into a leading hub port.

5.4.8 International Collaboration

Engaging with the international maritime community is vital for Durban Harbour's ambitions to become a hub port. This involves participating in global port and maritime organisations like the International Maritime Organization (IMO) and the International Association of Ports and Harbors (IAPH). Such engagement offers opportunities to share knowledge, adopt best practices, and align with global port safety, security, and environmental sustainability standards. Fostering international collaborations with other ports and maritime institutions can enhance trade connectivity and technological exchange. These collaborations will elevate Durban Harbour's global standing and contribute to seamless global trade, driving economic development.

5.5 Limitations

This section outlines the limitations encountered during the study, acknowledging the factors that may impact the interpretation and generalisability of the findings:

i. The dynamic nature of global trade means that data and trends can rapidly evolve, potentially altering the strategic importance or development needs of Durban Harbour.
ii. The focus on Durban Harbour within the Southern Hemisphere's trade dynamics might not capture global maritime shifts comprehensively.
iii. The assessment of stakeholders' perspectives may not fully represent all interested parties, particularly smaller local communities or emerging industry players.
iv. The feasibility of some recommendations, especially around large-scale infrastructural projects and digital transformations, is contingent upon political, economic, and environmental factors that can change unpredictably.

Recognising these limitations is crucial for understanding the context of the study's findings and ensuring a balanced interpretation.

5.6 Directions for Future Research

This section highlights potential areas for future research that can build upon the findings of this study and further contribute to the development of Durban Harbour as a major container hub port:

Explore the Impact of Global Maritime Logistics Trends and New Shipping Technologies on Durban Harbour: Investigate how emerging trends and advancements in maritime logistics and shipping technologies can influence the operational efficiency and strategic positioning of Durban Harbour.

Investigate Innovative Sustainability Practices and Their Implementation in Port Environments: Examine the adoption and impact of sustainable practices in port operations, focusing on environmental conservation and long-term viability.

Examine the Impacts of Port Development on Local Communities and Explore Strategies for Inclusive Growth and Community Engagement: Assess the socio-economic effects of port expansion on local communities and develop strategies to ensure inclusive growth and active community participation in development projects.

Conduct Ongoing Research into Digital Innovations, Cybersecurity, and the Integration of AI and IoT in Port Operations: Explore the role of digital technologies, cybersecurity measures, and the integration of artificial intelligence (AI) and the Internet of Things (IoT) in enhancing port operations and management.

Perform Comparative Studies with Other Successful Hub Ports Worldwide to Yield Practical Insights for Durban Harbour: Conduct comparative analyses with established hub ports globally to identify best practices and strategies that can be adapted for Durban Harbour.

Develop Detailed Economic Models to Forecast the Broader Economic Benefits of Port Development: Create comprehensive economic models to predict the long-term economic impacts of port development, including job creation, GDP growth, and trade enhancement.

Future research in these areas will provide valuable insights and guidance for policymakers, port authorities, and industry stakeholders, supporting the strategic development of Durban Harbour and its transformation into a leading hub port.

5.7 Chapter summary

The Durban Harbour is currently being transformed into a hub port and this offers a good opportunity to influence regional and international trade dynamics. To achieve this vision, all the stakeholders must pull together with a concerted effort that is directed by strategic planning, innovation, and the need to be sustainable and socially responsible. Through the suggested measures, including the improvement of infrastructural investments, the adoption of digital transformation, the establishment of the economic and strategic planning, the incorporation of sustainability measures, the involvement of stakeholders, the development of the workforce, the reinforcement of regulatory measures and policies, and the promotion of international cooperation, Durban Harbour will be able to reach its full potential of being a large container hub. Such initiatives will not only improve on the capacity of the port and its operational efficiency, but also make sure that growth is realised in ways that are in line with environmental conservation and social equity. The strategic location of the port, excellent infrastructure and advancement in technology will make it a key player in the logistical aspects of maritime transport all over the world. Further, the focus on stakeholder involvement and community influence will promote all-inclusive growth, whereby the proceeds of port expansion will be reflected in the communities and will also help boost economic growth in the region. Finally, the development of Durban Harbour into a hub port will propel economic growth, environmental management and social welfare not only to South Africa but also to the rest of the world as the harbour becomes a critical point in the world shipping system and as well as sustainable port development. This innovative and responsible outlook will help Durban Harbour to overcome the challenges of the modern maritime trade and have a successful future.

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Appendices

Appendix A; Approval letter

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

22 September 2025

Sibonelo Maxwell Bhengu (223144717)
School of Acc Economics & Fin (Prior Restructuring)
Howard College Campus

Dear SM Bhengu,

Protocol reference number: HSSREC/00009205/2025
Project title: The development of the Port of Durban as a container hub for the Southern Hemisphere.
Degree: Masters

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 23 August 2025 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

Incidents of adverse events and serious adverse events (AEs and SAEs) should be reported in writing to HSSREC, the study sponsors, and any regulatory authority (where appropriate), within 7 working days of the occurrence for local sites and 14 days for all other South African sites.

This approval is valid until 22 September 2026.
To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

HSSREC is registered with the South African National Health Research Ethics Council (REC-040414-040).

Yours sincerely,

[redacted]

Doctor Shamila Naidoo (Interim Chair)

/dd

Appendix B; Turntin report

SEE SEPARATE ATTACHMENT