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Security Management Strategies for a Proposed Marine Transport Terminal at Nembe Waterfront, Port Harcourt

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The present study aimed to develop a sustainable and contemporary design solution that can be applied to modernize or improve security control in the terminal facility and take away the phobia for water transport. The specific objectives were to: identify the security issues in marine transport terminal in Port Harcourt; analysing the space and placement of facilities in the marine transport terminal in Port Harcourt among others. The use of appropriate materials, forms, and spatial configurations to enhanced the terminal's aesthetic appeal while maintaining functionality. The design concept contained sustainability and environmental considerations and free flow of people in and outside the facility which will enhance the users' circulation and security. The results of the study reveal among others that all through the terminal, security facilities must be available. Theft of commodities and terminal facilities will be prevented by the provision of security stations. The hotel Accommodations, the terminal building, and the adjacent surroundings all require physical security measures. These measures include the following: Closed circuit television (CCTV), intrusion detection and door security. Based on the results of the study, recommendations were put forward; among which were: The placement of security checks or control buildings within the operational points or units of the marine terminal facility be appropriately spaced apart as this allows for effective security measures to be implemented throughout the terminal.

Keywords: Transport, Circulation, Security Control, Modern terminal.

INTRODUCTION

Marine transportation plays a significant role in global trade, accounting for 80% to 90% of all trade. Every year, billions of tons of cargo, including bulk goods, containers, and liquids, are transported across the world's oceans. However, air travel has become the preferred choice for perishable and high-value items while water transportation is the safest means of transporting people and goods. Therefore, in the marine transport industry,

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it is crucial to have effective master planning, adaptability to rapid changes, and infrastructure expansion to meet evolving needs. Efficient interfaces between roll-on/roll-off (RoRo) vessels and shore facilities are essential for ensuring smooth operations in the marine transport industry. Proper coordination and integration between the vessels and the shore facilities are necessary for seamless passengers and goods transition and overall operational efficiency.

By identifying and addressing the challenges faced by a facility, we can create opportunities for improvement and growth, ultimately making it stand out. The extent to which a state or country prioritizes technological advancements in the maritime industry is reflected in its maritime technology advancement plan (Edih, Onoriode & Faghawari, 2022).

Ensuring robust security management is crucial, considering the large number of travelers and the diverse range of users involved. Regrettably, the Nembe Jetty in Port Harcourt city suffers from inadequate security management, causing frequent difficulties for passengers and travelers during their transitions, which will give rise to poor inflow of passenger or users of the facility due to the lack of security planning.

This paper aims to enhance water mobility in terminals by addressing security issues caused by poor design. Inland waterways, composed of navigable rivers, lakes, coastal creeks, lagoons, and canals, have long served as a means of transporting goods and services from one point to another. Inland water transport is known for its economic efficiency, energy-saving nature, and environmental friendliness when it comes to moving various types of cargo. It also contributes to commerce, wealth creation, poverty alleviation, and employment opportunities, particularly for young people involved in boat building industries and related activities such as welding and fabrication.

Nonetheless, Port Harcourt, Rivers State capital, like any other rapidly growing capital city, has experienced significant economic development. As a result, commercial activities have developed in the region. The issue of water transportation has been downplayed and as a result reduces the urge of people moving through water even if it is a faster and more efficient mode of transportation for facilitating movement to other parts of the state and regional states as well. Connectedly, the Nembe jetty in Rivers State is facing several challenges that hinder its efficient operation and effectiveness in facilitating maritime transportation. The terminal lacks automation, real-time data sharing, and digital platforms that can hinder the terminal's ability to keep up with industry advancements and meet users' expectations. The terminal also faces challenges in maintaining robust safety and security control/ protocols. Insufficient surveillance systems, inadequate emergency response plans, and inadequate security personnel compromise the safety of users of the facility, boats, and ferries within the terminal, making it vulnerable to theft and security breaches.

Research Aim And Objectives

The aim of this study is to develop a sustainable and contemporary design solution that can be applied to modernize or improve security control in the terminal facility and take away the phobia for water transport. The specific objectives are to:

- i. Identify the security issues in marine transport terminal in Port Harcourt;
- ii. Analyse the space and placement of facilities in the marine transport terminal in Port Harcourt; iii. Evolve a design proposal of a marine transport terminal in Nembe Waterfront that has efficient circulation network and safety requirements.

Theoretical Framework

The theoretical framework adopted for this paper is the theory of Security. In architecture, the theory of security relates to the design and implementation of measures to protect buildings, spaces, and their occupants from potential risks or threats. It encompasses both physical security features and psychological aspects to create

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environments that are safe, secure, and resilient. Here are some key concepts and principles related to the theory of security in architecture:

1. **Crime Prevention through Environmental Design (CPTED):** This approach focuses on designing spaces and buildings in a way that deters criminal activity. It involves principles such as natural surveillance, territorial reinforcement, access control, and maintenance. By incorporating these principles, architects can enhance security and reduce the likelihood of criminal incidents.
 2. **Perimeter and Access Control:** Controlling access points and establishing clear boundaries is crucial for security. Architects consider the placement and design of entrances, gates, fences, and barriers to regulate movement and prevent unauthorized access. Design strategies might include employing controlled entry points, implementing security systems, and integrating landscape elements as natural barriers. (Garacia, 2006)
 3. **Surveillance and Monitoring:** Incorporating surveillance measures, such as CCTV cameras, lighting systems, and alarm systems, is essential for maintaining security. Architects integrate these technologies into the design to help with monitoring and deterrence. The placement and visibility of surveillance equipment are carefully considered to maximize effectiveness.
 4. **Secure Design Principles:** Architects apply secure design principles that address specific threats and hazards. This can include designing against forced entry, blast resistance, fire protection measures, and structural resilience. Security features are integrated seamlessly into the overall design, maintaining balance with aesthetics and functionality. (Fennelly, 2012)
 5. **Wayfinding and Emergency Preparedness:** Architects ensure that buildings have clear signage, exit routes, and emergency procedures to guide occupants during emergencies. Designing spaces that are intuitive and easy to navigate can minimize panic and facilitate safe evacuations. Consideration is given to emergency lighting, emergency exits, and safe assembly areas.
 6. **Psychological and Social Well-being:** The theory of security also recognizes the importance of psychological and social well-being in creating a secure environment. Promoting a sense of safety, comfort, and community can contribute to the overall security of a space. Architects consider factors such as natural lighting, open and inviting spaces, and creating opportunities for social interaction and surveillance.
- These principles guide researcher in designing secure environments that protect against potential risks while maintaining a balance with the overall design intent. It is important for architects to collaborate with security experts, consultants, and stakeholders to address specific security requirements for each project.

LITERATURE REVIEW

Water transportation, involves the movement of people and goods using various watercraft over bodies of water such as barges, boats, ships, and sailboats. It offers advantages such as costeffectiveness for transporting heavy items over long distances and relieving strain on road transportation systems for bulk freight. However, it is slower compared to road transportation and requires significant investment in canal construction, maintenance, and dredging. To ensure the efficient functioning of water transportation, a well-organized operational base is essential. In the case of water transport, this base is provided by marine transport terminals, which accommodate various activities and facilitate smooth movement of people and vehicles. Proper spatial organization is critical in the design of a marine transport terminal to enable effective traffic control within the terminal.

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Connectedly, a marine transport terminal, sometimes referred to as a seaport or port, is a structure on a navigable river or coast that acts as a hub for the movement of people, products, and ships via maritime transportation. It offers a range of facilities and services to make it easier to load, unload, store, and move people and goods between land-based and maritime transit. Certainly! Let's delve further into the concept of marine terminals and their significance in the realm of maritime transportation.

A marine terminal serves as a vital hub within a port where the efficient transfer of passengers and goods takes place. While it is important to clarify that a marine terminal is not a separate station for boats, ferries or ships, rather it is a designated area where boats, ferries or mini ships can dock and engage in loading and unloading operations (Marine Insight, 2022). Within the bustling environment of a harbor or port, various activities take place, from passengers awaiting embarkation to those already on board. Given the high volume of people, the transportation and handling of goods become essential for the smooth operation of the terminal. Marine transport terminals sometimes referred to as wharfs or docks, which cater to this demand. They serve as crucial points where boats and ferries can dock, allowing for efficient loading and unloading operations.

Beyond cargo operations, marine terminals play a critical role in supporting the oil industry. In the realm of offshore oil drilling and production, marine transport terminals are indispensable. They are strategically located in deep river, oceanic and high sea zones sometimes where oil rigs and drilling activities take place. These terminals handle the transportation, storage, and transfer of crude oil containers. By situating these terminals in such areas, a steady supply of crude oil and gas is ensured for inshore regions when needed. Furthermore, the presence of these terminals contributes to the prevention of potential oil spills or catastrophes that could occur if oil tankers were to be overloaded. This proactive approach helps to safeguard the marine environment and minimize the risks associated with oil transportation.

Therefore, designing marine transport terminals with security control in mind is essential, as passenger and employee safety and security must be guaranteed. It entails putting measures in place that restrict unwanted access, identify possible dangers, and react appropriately to emergencies. Security control in maritime transport terminals is greatly aided by architectural design. This can involve incorporating security features into the terminal's architecture and structure as well as designing safe access points and surveillance systems. To improve security, for example, the implementation of security checkpoints, regulated access points, and well-placed surveillance cameras can be used.

DEFINITION OF TERMS

Marine Transport Terminal

A marine transport terminal, sometimes referred to as a seaport or port, is a structure on a navigable river or coast that acts as a hub for the movement of people, products, and ships via maritime transportation. It offers a range of facilities and services to make it easier to load, unload, store, and move people and goods between land-based and maritime transit.

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Security Control in Marine Transport Terminals

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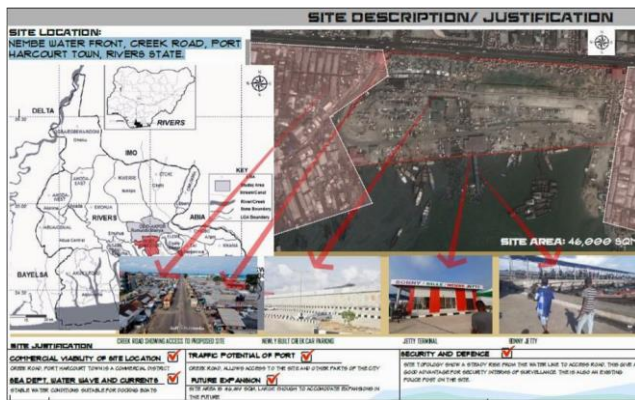
STUDY LOCATION

Port Harcourt is the capital and largest city of [Rivers State](#) in Nigeria. It is the [fifth most populous city](#) in [Nigeria](#) after [Lagos](#), [Kano](#), [Ibadan](#) and [Benin](#). It is situated in the Niger Delta and lies along the Bonny River. The predicted urban population of Port Harcourt in 2023 is 3.5 million. With a 2015 United Nations estimate of 2,344,000 people, the Port Harcourt metropolitan area has nearly twice the population of its urban area. The capital of Rivers State, Port Harcourt, is the secondlargest port in Nigeria and is the location chosen for the marine transport terminal. Port Harcourt, which is 64 kilometers from the Atlantic Ocean, was built on a cliff of solid land near deep water on the Bonny River bend.

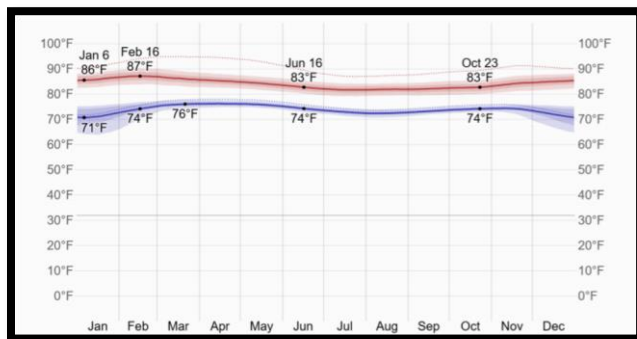


Geographical Location of the Project Site in Rivers state map

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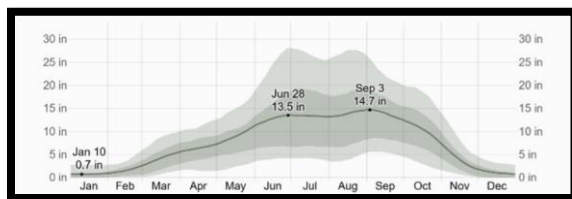


Source: Author (2023)



Temperature Range for Rivers State

Source: Meteoblue, (2023)



Rainfall Chart for Rivers State

Source: Meteoblue, (2023)

METHODOLOGY

In this study, the case literature review and analytical methodologies were used. Case studies are tools for accurately assessing and forecasting the past, present, and future. To accurately predict the future, one must do a prospective examination of the potential and a careful investigation of the present. Many people agree on the significance of contrasting the present with a look back in time.

The case studies, both national and international, effectively conveyed an overview of water transportation, with a focus on the architecture of marine transport terminals in the past and present. The investigations reveal data from which inferences and adjustments were made in order to conduct this study.

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The researcher employed a purposive sample technique, utilizing samples considered knowledgeable and aware of the subject matter who accurately represented the population. The study took into account many factors that could impact the population, such as socioeconomic position and access to education. The target population was the subject of case studies. The primary sources of data were the use of case studies and interview while the secondary data were from Literature review

RESULTS AND DISCUSSIONS

This section considers the design variables and data which has been collected and synthesizes it into a solution for the design program.

Design Guidelines

Some aspects of the Marine Terminal's design are recognized as critical. According to Neufert's Architects Data and Time Saver Standards, some of these are considered strict general rules based on recommendations from extensive studies and study. Others provide a variety of options, leaving it up to the designer to select the one that best fits the current situation or scenario. New architectural aspects, on the other hand, require that design processes consider present challenges that may have an impact on the future. These are the issues related to sustainability. These elements will help achieve the project's aims and objectives, as well as propose a solution to the recognized challenges.

Design Considerations

The study reveals that the following elements must be completely considered while designing an efficient terminal structure to ensure the areas' safety, functionality, and aesthetic appeal. The location of transportation routes will enable proper planning of entrances and exits, as well as the placement of facilities, the services that the terminal will provide, and the kind and volume of traffic (pedestrian, vehicle, and commodities). These will help determine the size, configuration, and type of amenities required in the terminal, as well as how to organize the terminal's areas and define the nature of ferry and boat operations on the site.

Keeping this in mind, a few amenities must be available for the water transport terminal to operate effectively. They could be viewed as the following and should provide service to all terminal users, including tourists, travellers, and staff: tourist/Passenger Facilities, staff facilities, administration, service and maintenance facilities, and supporting facilities.

Security Facilities:

All through the terminal, security facilities must be available. Theft of commodities and terminal facilities will be prevented by the provision of security stations. The hotel Accommodations, the terminal building, and the adjacent surroundings all require physical security measures. These measures include the following:

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- i. **Closed Circuit Television (CCTV):** Security surveillance cameras will be incorporated into the design at certain spots, for example, the terminal's main terminal and the security checkpoints and line-up areas.
- ii. **Intrusion Detection:** An intrusion detection alarm system has to be installed, and alarms are placed at all gate positions as well as key entrances and exits.
- iii. **Door Security:** Service doors and the funds room have cypher locks fitted for door security.
- iv. **Security Personnel:** the police or other security personnel as permitted by the law should be at strategic points to ensure safety of the users of this facility.

CONCLUSIONS AND RECOMMENDATIONS

The maritime industry is undoubtedly facing the need for adaptation as global developments, technological advancements, and socio-economic shifts takes place. This is particularly crucial given the dynamics of maritime transportation. In this context, it was important to evaluate the Nigerian experience and the strategic measures taken to reposition the marine industry. In essence, this study aimed to enhance security control management of the proposed marine transport terminals by identifying the security issues in marine transport terminal in Port Harcourt; analysing the space and placement of facilities in the marine transport terminal in Port Harcourt; and evolve a designing proposal of a marine transport terminal in Nembe Waterfront that has efficient circulation network and safety requirements.

The changing social and economic requirements further emphasized the necessity for architectural adaptation. This study also considered the redesign or redevelopment of industrial zones and terminals. However, the proposed design for a marine transport terminal development took into account the potential and limitations of Port Harcourt city. This design has proved a valuable asset to the city, enhancing the urban landscape while promoting environmentally friendly architecture and boosting tourism. By addressing these aspects, the goal is to contribute to the improvement of the Nigerian marine industry and establish a sustainable and prosperous maritime transport system.

RECOMMENDATIONS

Based on the results of the present study, the following recommendations are put forward. They are:

1. It is important to prioritize the zoning of the main terminal building and its associated supporting facilities within the marine terminal facility. This ensures efficient and well-organized operations.
2. The placement of security or control buildings within the operational points or units of the marine terminal facility should be appropriately spaced apart. This allows for effective security measures to be implemented throughout the terminal.

Contribution of Knowledge

With the aim of enhancing security control in the maritime industry and bolstering the economic status of the state, this study has uncovered valuable insights that can serve as a foundation for the construction of a marine terminal. In doing so, it contributes to the existing knowledge on the design of marine transport terminals, expanding the understanding in this field. Furthermore, this study presents an opportunity to provide facilities for the city's development by improving water transportation and facilitating commercial activities. It also stimulates new avenues for thought, knowledge discovery, and encourages further research in this area. Certainly, the research conducted in this study holds great significance for the maritime industry and the economic growth of

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the state. By focusing on strengthening security control, it addresses a crucial aspect of maritime operations, ensuring the safety and protection of assets, infrastructure, and personnel.

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