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BOAT TERMINAL ARCHITECTURE: ANALYZING AND UNDERSTANDING CIRCULATION IN BOAT TERMINAL BUILDINGS

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ABSTRACT

In order to achieve smooth traffic flow in metropolitan areas, transport services have increased significantly. One of the nation's most widely utilised transit systems is the water transit system, particularly in Nigeria's delta region (Niger Delta). Incorrect arrangement of functional areas can lead to conflicts between different aspects of the functions in the ticketing and checking points' circulation pattern or flow sequence. The goal of this study is to create a profitable and efficient boat terminal that would suit the needs of Rivers State, Bayelsa State, and other Niger Delta regions. To that end, the author carried out in-depth research on successful circulation at boat ports. Circulation patterns and access points were created as part of the research with the intention of reducing impacts on the nearby facilities. This was achieved by directing cars into the terminal area and to the proper parking spaces, maintaining steady, secure vehicular flow, and providing easy access for emergency services and the delivery of products. Provisions for a single need for both horizontal and vertical circulation components were also included in the specification.

Introduction

The movement of products and people have existed since the beginning of time. By obtaining raw resources and exchanging goods and cultures with other people, it was the earliest man's finest method for expanding the scope of his activities, expanding his horizons, and raising his standard of living. Different modes of transportation are related by everyone from the ancient Egyptians to Chinese to modern technology, formed by the environment, technology, and demand. The lack of an appropriate transportation infrastructure in Nigeria has been cited in numerous studies, for example (Ighodaro, 2009), Badejo (1995) and (Agbigbe, 2016) as a key barrier to the country's economic growth and an inefficient means of moving people and goods. Including both natural and artificial entities that interact with one another and function in a physical setting, the marine transport system is a highly complex and expansive sociotechnical ecosystem (Mullai, 2004). The primary components of the system are transportation devices, modes of transportation, circulation, infrastructures, and facilities, which are connected via an information system and activities involving transportation. Water travel has a long history that dates to the dawn of man's evolution. It is not possible to identify the exact time marine activity commenced. However, travel on the Nile was a part of Egyptian development, one of earths oldest civilizations. Ancient literary sources that initially supplied indications as to early marine activities have been clarified and enhanced by the scientific network of established sites and findings, as explained by (Bowen, 1972). The inventiveness of prehistoric navigators, who avoided sailing around stormy headlands in the frail skin boats by disembarking on one side of the peninsula, moving overland to the other side before continuing their journey by water, is demonstrated by evidence gathered from numerous archeological sites. Man uses currents, tides, and winos to move, explore, and start trading routes on a scale that overland travel cannot support ever since he invented the first boats. This study therefore seeks to analyses and understand circulation in boat terminal building, it seeks to fully understand vertical and horizontal circulation in these types of facilities and how these circulations affect the building users in their daily activities.

Water transportation history in Nigeria

prior to the Colonial Era, the lengthy history of humanity is closely entwined with the history of transportation. It is a tale of how man overcame challenges to conquer the land (in the case of land transportation), the air (in the case of air transportation), and the sea (in case of water transportation). The history of water transportation in Nigeria was not unique to the country or region. The early 1970s pioneering studies of Professor R.K. Udo are arguably the origin of the research and publications on inland water transport in Nigeria. According to (Udo, 1970), Nigeria has a lot of natural resources, including water, and has the opportunity to provide services to the majority of West African nations that are landlocked, including Burkina Faso, Chad, Mali, and Niger. Over 8000 kilometers of the country's inland waterways are navigable, and Nigeria is highly endowed with surface water resources. For instance, (Badejo, 1995) determined that the primary rivers whose channels provide the longest waterways into the country's hinterland are the River Niger, after which the country is called, and Benue, its greatest tributary. Both rivers originate outside of the nation, but they come together at the confluence at Lokoja and later join the Gulf of Guinea through a vast network of distributaries and creeks that make up the Niger Delta. They also mentioned the many rapids and falls found along many of Nigeria's rivers, which are in part to blame for certain sections of these rivers' inability to be navigable. The lack of channelization and dredging of navigable rivers, poor river port construction and rehabilitation, a lack of water transportation infrastructure (comfortable boats, jetties, and quays), and safety and security issues along these navigable waterways were some of the physical barriers he listed to better performance in the sector. (Ezenwaji, 2010) concentrated on Nigeria's inadequate usage of inland waterways as transportation channels. In another study, (Obed, 2013) found that facility management, jetty operations, and boat building are among the lucrative prospects that inland water transport offers to investors. He concurred with his earlier statement that potential investors are deterred from taking use of the lucrative economic opportunities that the Nigerian Inland Water Transportation offers due to security concerns. Inland water transport development issues like river channel dredging and maintenance, private sector participation in the water transport sector, construction and rehabilitation of river ports, acquisition of passenger ferries, security boats, building of channels buoys, and other projects have all been covered in a number of reports from consultancies by development agencies and firms. The conclusions reached are that conflicts between federal and state agencies involved in overseeing inland water transport in Nigeria and apathy on the part of investors are some of the factors preventing further development of inland water transport in Nigeria.

Boat terminal architecture

The planning and design ethos of the boat terminal complex is focused on the management and design of human traffic, or more specifically, traffic delineation. The boat terminal complex combines goods delivery and distribution with passenger entry and exit as well as pedestrian traffic from tourists. Thus, the goal of this boat terminal complex's philosophy is to strictly separate traffic into modes that avoid conflicts between people or other vehicles, sea traffic, or both. Actually, the boat terminal, which has both commercial and touristic inclinations. The author suggests that the commercial and tourism components of the design be planned for the same location. In this design concept, the Yenagoa waterfront is being developed in both the commercial and tourism sectors of the state. Both the terminal building, which is concerned with the commercial sector, and an accommodation facility, which is concerned

with housing tourists or leisure seekers, will be included in the design. So that the planning of the Boat Terminal is a complex not merely a boat terminal. The boat terminal's planning concept aims to regulate traffic within the complex. This demarcation will be in the form of a distinct and clear direction for each circulator, allowing vehicular circulation to be restricted to a certain area of the design just as pedestrian circulation is controlled by walkways and paved paths that direct movement.

Functional requirements for a boat terminal

The placement of the transportation route would enable careful planning of the approaches, exits, and facility locations. The amenities at the terminal, as well as the kind and volume of traffic (vehicles, pedestrians, and cargo), This may help in deciding the size, structure, and kind of amenities anticipated at the terminal, as well as how the terminal's spaces will be organized, how ferry and boat activities will be designed, and the site's general characteristics. In light of this, several services are required in order for the water transport terminal to function correctly (Dagogo and Lawson, 2021). They may cater to all terminal users, including travelers, employees, and passengers, and they might be categorized as follows: Tourist/Passenger Facilities, Staff facilities, Administration, Service and maintenance facilities, Supporting facilities.

Circulation in boat terminals

The building's circulation is crucial to how we feel about it, whether it's safety, security, or comfort. If the movement from where we've been to where we're going is unconscious and predictable, a building is said to have high circulation. Spatial organization and circulation are essential components of any design process. In most circumstances, it is ideal for the space's circulation to occupy at least 40% of the entire area. And in the interior areas, comfortable circulation is frequently achieved with at least 900mm to 1.2m broad paths. Circulation is vital in organizing a boat terminal since it expresses both fundamental, practical necessities and more abstract value systems. The circulation structure or trend developed within and outside the terminal is crucial in affecting people's perception and use of the terminal. Every terminal's circulation pattern should be simple and clear. As a result, there is an immediate need to optimize the flow of foot and vehicular traffic, as well as strategically arrange material handling facilities and parking. Addressing these circulation issues through methodical planning and construction will enhance terminal utilization. Certain major characteristics, such as automotive and pedestrian circulation, must be addressed for effective circulation in a boat terminal.

Vehicular Circulation: A Terminal has three to four distinct kinds of vehicular circulation. These pertain to parking access, service and delivery access, and maintenance staff circulation. Emergency vehicle access is a fourth category. All of this will be considered during the design process in order to allow all of these motions safely and with minimal conflict with people on foot. Another phase is to improve the safety and convenience of vehicular traffic and parking.
Pedestrian Circulation: Planning for pedestrians might be a difficult task, but it is an important role both inside and outside the terminal. Typically, terminals with a well-planned and functional pedestrian network are more livable and convenient for pedestrians. A well-planned pedestrian circulation system can also provide safe walking areas in a Terminal. Furthermore, such a system can foster a healthy interplay between different sorts of land uses, provide a more comprehensive feeling of neighborhood, and allow for a greater appreciation of the area's natural beauty. In general, access and circulation are crucial to the overall success of a terminal. This study establishes circulation patterns and access locations with the goal of minimizing impacts on the surrounding facilities. This would be accomplished by providing clear, safe vehicular mobility; directing traffic into the terminal area and to appropriate parking places; accommodating sufficient parking at or near destinations; and enabling convenient access for emergency, service, and delivery vehicles.

Internal Circulation

Circulation in Boat Terminals Building;

The term "circulation," as it is frequently used in architecture, describes how people and objects move across a building's interior as well as between its entrances and exits over time. It may be broken down into three categories: the kind of use, the amount of use, and the timing of use.
The rate at which circulation develops can be quick or gradual. The visibility and density of people in the area will determine how quickly the movement occurs. All structures require swift, easy, and safe circulation in both normal and emergency conditions. Numerous pathways, including lobbies, hallways, staircases and lift - hoist ways, can be used to direct this traffic.
There are two categories of circulation (the flow of people and products inside interior areas in boat terminals): vertical circulation and horizontal circulation. When a circulation pattern is stated as horizontal, it relates to how people enter and exit a certain floor or

level; whereas, if it is described as vertical circulation, it refers to the interaction between the levels; specifically, how people travel between the different floors.
Walkways, travelators, and corridors are examples of horizontal circulation methods, whereas escalators, lifts, stairs, and ramps are examples of vertical circulation methods.

Vertical circulation and its components

The performance of a boat terminal structure depends on the vertical movement of traffic, both during normal operations and during crises. In actuality, the floor design is significantly impacted by the location of elevators or stairs. Because of this, careful thought should be given to the sort of vertical circulation to be provided, the number of units required, as well as their positioning, layout, and architecture. Traffic can go from one floor to another in a multi-story building via ramps, stairs, elevators, or escalators. The driven machinery is frequently substituted by stairs when the generator is switched off, a mechanical issue arises, maintenance is being done, or an emergency arises. Other styles of human lifts, in addition to traditional elevators, are occasionally used in homes, warehouses, and garages.

There are two types of vertical circulation systems.

Elevators, escalators, ramps, and other Class A systems are designed to carry both people and products.

People cannot be moved using Class B systems like vertical conveyors and dumbwaiters.

Horizontally circulation and its components

Any of the various sorts of passageways, including lobbies, doors, and halls, can filter this circulation. The act of shifting or moving horizontally across lobbies, doorways, and hallways from one area to another is known as horizontal circulation.

A 1.8-metre-wide corridor should be free of obstructions. To achieve a 1.2-metre unobstructed width, radiators and other devices, including fire extinguishers, should ideally be recessed. This lessens the threat they may pose to a large number of impaired people, especially blind and partially sighted people. There should be enough tone difference between the ceiling, walls, and floor. It can aid with navigation and enable blind and partially sighted people to gauge the size and shape of a room or hallway.

Lobbies should only be used in emergency situations. A wheelchair must be accessible to exit one door and enter another in the entrance lobby and other interior lobby areas. Anyone assisting a wheelchair user must be allowed to get away from one door before going through another. Floor mats should have a solid surface that doesn't get slippery in wet weather, be well secured, close-fitting, and without any holes. They should also be flush with the floor. Close-grained rubber mats or mats consisting of short fibers are preferred. Avoid using mats that have a soft core, rope, or metal attachment. Internal doors: Wherever possible, a simple opening range of 900mm should be used for internal doors, which should have an opening range of at least 800mm.

The visible opening distance of the door should be increased to 825mm when approaching from a corridor that is less than 1500mm deep and at a 90° angle. This is a minimum norm; doors with broader visible opening widths would be more accessible; whenever practicable, a clear opening width of 900 mm is advised.

General ancillary services

A. The Core Management: this is the focal point for activity coordination in the interchange. The administrative unit includes all facilities that allow for simple monitoring of operations, such as staff offices, boardrooms, and a control tower. The following areas are housed under the central administration:

i) The Greeting Area: When approaching the interchange, the greeting area should be instantly visible and friendly. It should be structured in this manner in respect to waiting areas. A general waiting room is required in the main recreation area. Because the recep-

tion/waiting area is the focal point of the interchange administration's activity, key entrances and passageways leading to rooms and even entire departments must be established.
ii) Operational Offices: Operational offices are necessary for the smooth operation of the transportation interchange. These offices are required for daily purchase, information gathering and processing, physical item administration and handling, and exchange policies. The subsequent departments will be utilized to calculate the amount of space required:

- administrative section
- accounting section
- stores section
- technical maintenance section
- catering section
- lodging section
- engineering section
- recreation section

B. Welfare Centre: there are amenities available for the convenience and comfort of interchange workers and users. They are often supplied to improve the exchange's favorable working environment. There is a restaurant, a kitchen, a snack bar, indoor and outdoor entertainment areas, and so on.

C. Medical Consultation Rooms: the consulting room is the primary working unit of most departments, and all other departmental rooms can be clustered around it (or rooms in bigger systems). The size of consultation rooms is determined primarily by whether therapy is likely to be administered in addition to patient assessment and the sort of equipment required for such treatment. If the consulting room is large enough, undressing, examination, and minor treatment can all take place there, but they can also take place in an adjacent examination room. The latter approach can save the doctor time, provide greater flexibility, and allow a nurse to treat a patient in an examination room while the doctor continues to treat another patient in the consultation room.

D. Safety: these are the amenities required to ensure the building's, its users', and their property's security. They include building automation to avoid risks, as well as properly situated escape staircases and wells for its users to guarantee enough protection of life and property. A unified enforcement unit should also be formed to halt unlawful activity and handle conflicts as quickly as possible.

E. Technical resources: these amenities are required to ensure the building's proper operation with minimum automation. Access stairs, lifts, and mechanical and electrical equipment are among them.

F. Business: transport hubs generate revenues in addition to providing successful multimodal transportation, which results in the economic upliftment of the country as a whole. Allowable leisure spaces, stores, and office levels for unknown and projected tenants will make room for group employees.

G. Tourist amenities: a garden park alongside the structures, a café, and a viewing platform will be added as additional amenities to improve the site's tourism potential.

H. Passenger: The interchange building will feature amenities and attractions for passenger comfort, as well as a ticket office and weighing scales, and will serve as a service hub for the transfer of people and cargo between automobiles and rivercraft. Additionally, it can house offices and a post office. A solid circulation network that allows for smooth and direct luggage boarding and unloading is a must. The size of the ticket lobby is mostly influenced by the length of the ticket counter, which is dictated by the number of peak-hour boarding passengers. There will be enough room to allow for passenger congestion and the unavoidable cross-flow of vehicles. Peak hour passengers are the most numerous passengers who board and exit during the peak of a busy day or week.

I. Environmental: these are facilities that guarantee the total health of the structure's premises and the facility's overall atmosphere. These consist of a well-landscaped area, ample parking, well-lit buildings, and so on.

Conclusion

Poor circulation has been identified as a foremost architectural issue for boat ports. Because the terminal complex involves both land and nautical activities, enough traffic and pedestrian flow would be provided both outside and inside the terminal to address this subject. Boat port overcrowding is a typical source of division in these facilities. There is no agreement or flow of circulation since each sector of circulation is addressed differently. This challenge, however, may be handled by carefully designing the environment so that it guides and controls circulation. Carelessness or a lack of coastline construction in Nigeria and elsewhere is a worthy concern. The popularity and use of this sort of public transport is said to be boosted by amenities such as boat ports. It is suggested that appropriate financial resources be set aside for the development of the best-planned and most effective boat terminals. Additionally, regulatory rules must be in place to regulate the operation of these boat ports.

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