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A STUDY ON EFFECTIVE CIRCULATION IN BOAT TERMINALS IN THE NIGER DELTA REGION OF NIGERIA

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ABSTRACT

The role of public transportation services in achieving smooth traffic in urban areas has grown, and one of the most commonly used transit systems is the water transit system in Nigeria's Delta region. Different facets of functions may clash in the sequence of flow or circulation pattern in the terminal's ticketing and checking points as a result of incorrect placement of functional spaces. In this research, the author conducted a comprehensive study on successful circulation in boat terminals in order to achieve an effective and productive boat terminal that will be fit the position of Rivers State, Nigeria's oil-rich state and other Niger Delta areas. As a part of the study, circulation patterns and access points were developed in the design with the intention of reducing impacts on the surrounding facility. This was done by maintaining consistent, secure vehicular travel, routing traffic into the terminal area and to suitable parking sites and enabling easy access for emergency services and merchandise distribution. In addition, the specification contained provisions for a common requirement of horizontal and vertical circulation elements.

1. INTRODUCTION

Mobility has been one of man's needs since his formation. This need resulted in a gradual progression from pathways to highways, from streams and rivers to the ocean, and from railways to the sky. It is referred to as transportation. However, this study is concerned with the water mobility (transportation) that has been partially abandoned in most Niger Delta regions of Nigeria, where water transportation would have been their primary mode of transportation. The construction of an effective, scalable, and diverse transportation infrastructure is thus essential for meaningful socioeconomic development and the integration of all components of every society. The primary goal of this research:

- To build public water transportation terminals in order to boost the experience of boat transportation passengers and operators by implementing spatial planning and architecture techniques at the terminals to enhance a seamless merge between land-

bound and water-bound operations in terms of maximizing spatial utilization, versatility of operations, and optimum circulation.

- To encourage safe vehicular and pedestrian traffic both outside and inside the Boat Terminal Complex.

2. RELEVANT LITERATURE STUDY

The word boat can be defined as a small open vessel for travelling across water (EncartaDictionary, 2009). Boats are normally smaller than ships in terms of usage, but the term can be used informally of a larger passenger vessel. Boats were historically distinguished from ships by their size—any vessel small enough to be taken onboard a ship was called a boat. The distinction between boats and ships is no longer precisely established. While being longer than other ships, some larger vessels are referred to as boats. Terminals are logistics points where goods and persons are loaded and unloaded from cars. Ports, airports, bus stops, and train stations are also examples of terminals. A terminal is the terminus of a carrier line (such as a railroad, trucking, container line, or airline), complete with dockyard services, administration offices, storage shades freights, and stations (Gove, 1976). It goes on to distinguish between being a freight or a passenger. A station that is central to a wide area or acts as a junction with other lines at either point, as well as a town or city at the end of a carrier line.

As a result, a boat terminal is a location where small sea-bound cargo vessels and freight are transported or transported by boat around a body of water, as well as a dockyard and other ancillary services. Circulation patterns are valuable organizing elements in a boat terminal because they embody both basic functional requirements and more complicated value systems. The circulation structure or trend formed inside and outside the terminal is critical in influencing people's perception and use of the terminal. Circulation patterns in either terminal should be simple and straightforward. As a result, there is an immediate need to optimize the flow of foot and vehicular traffic, as well as to strategically place material handling facilities and parking. Addressing these circulation problems by systematic preparation and construction would increase Terminal use.

2.1 BRIEF HISTORY OF BOAT TERMINALS

Water movement can be dated back to the beginning of human civilization. It is impossible to pinpoint the precise moment that marine operations began. However, Egyptian civilization, one of the world's first civilizations, is connected to Nile river transportation. Bowen (1972) emphasized that the scientific network of proven sites and discoveries has explained and supplemented the ancient textual sources that first offered clues about early maritime activities. Evidence gathered from a variety of archeological sites demonstrates the Prehistoric navigators used their ingenuity to stop navigating across stormy headlands in their frail-skin vessels by disembarking on one side of the peninsula and then heading overland on the other side before resuming their journey by water. Since the invention of the primitive sail, man has used winds, tides, and waves to migrate, discover, and start trade routes on a scale that land travel does not allow. One of the most significant features of water transportation is the low amount of effort taken to moor floating craft. One man will drive a heavy boat or barge weighing several tons

across water slowly but gradually. A man would be unable to drive the same barge down the road or even along rails if it were placed on wheels.

2.2 ORGANIZATION OF UNITS

Circulation is the most difficult issue to solve in any transportation terminal. The boat terminal is no exception. Spaces should be arranged to allow for smooth, continuous flow into different operation units, and a consistent circulation center should be provided. Transition points would be given to provide the traveler a sense of direction in which they can identify. In addition, by properly arranging operation groups, pedestrian circulation can be reduced to a minimum. All of these moves lead to the relaxation, leisure, and travel activities of guests, travelers, or travellers in order to fulfill their physical and psychological needs.

2.2.1 UNIT -CLASSIFICATION OF ACTIVITIES

The first step in implementing the design principle was to organize the planned operations into units based on circulation as the primary aspect of incorporation. Each of these units

1. The inter-city ferry service.

2. The Recreational/Tourism facility.

3. Transportation systems such as bus stations and parking lots. The following step would be to determine the travel movements between the different units in relation to the point of origin of movement. The different points of origin are as follows:

1. The parking lot.

2. The bus stop

3. The facility for intercity transport. The travel movements of these units were divided into four categories: those with a high incidence, those with a reasonably high incidence, and those with a negligible incidence.

1. Transportation from the terminal to the different operation units.

2. Movement from the multiple operation units out of the terminal. This broad-based classification of transport movements is essential to ensure ease of mobility and easy detection of circulation.

2.2 FUNCTIONAL REQUIREMENTS FOR A BOAT TERMINAL

Transportation route location would allow for careful preparation of approaches, exits, and facility location. The terminal's facilities, as well as the type and amount of traffic (pedestrian, vehicles and goods). This may aid in determining the scale, structure, and form of facilities expected in the terminal, as well as the organization of terminal spaces, the design of ferry/boat activities, and the nature of the site. With this in mind, such services must be available in order for the water transport terminal to operate properly. They could serve all terminal customers, including passengers and tourist or staff, and could be classified as follows:

- Tourist/Passenger Facilities
- Staff facilities
- Administration
- Service and maintenance facilities
- Supporting facilities

2.3 JETTIES

It is critical that good jetties with adequate conveniences, warmth, and accommodation, as well as office facilities for the staff and passengers and their goods, be provided at each station for quick embarkation and disembarkation of passengers. It is also vital to have adequate mooring facilities at each port, as using canoes to off-load passengers and freight mid-stream is highly risky.

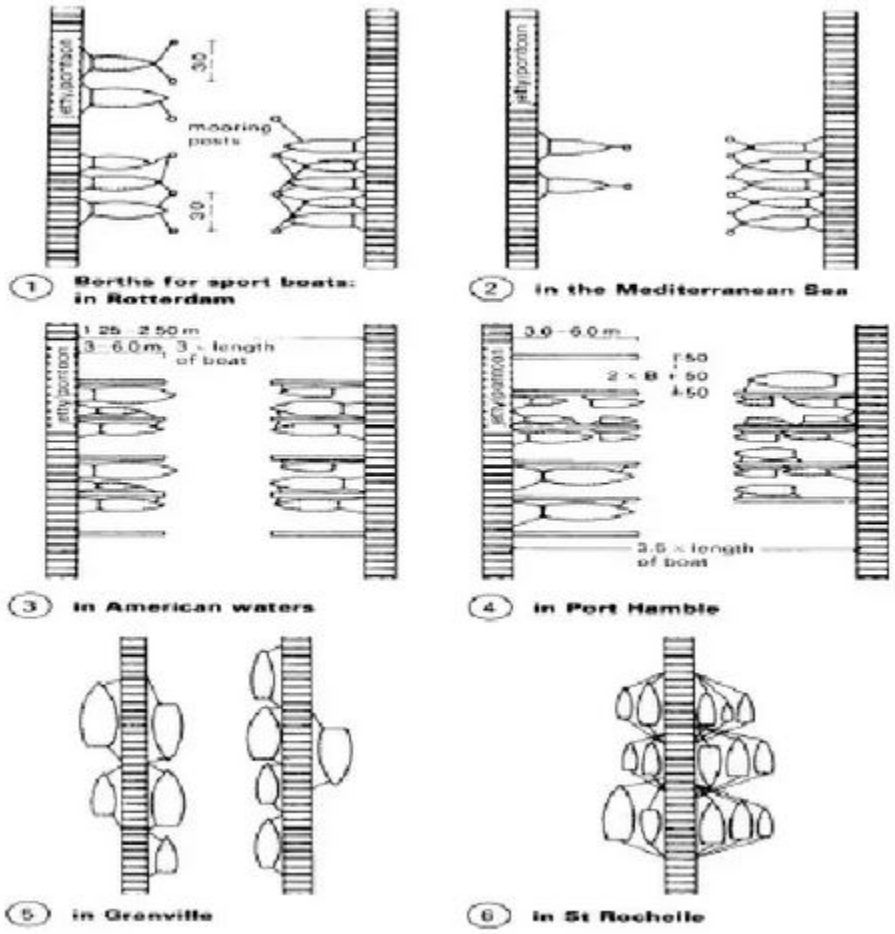


Fig. 2.3 Types of Berthing Facilities(source: Architect'sData 3rd Edition)

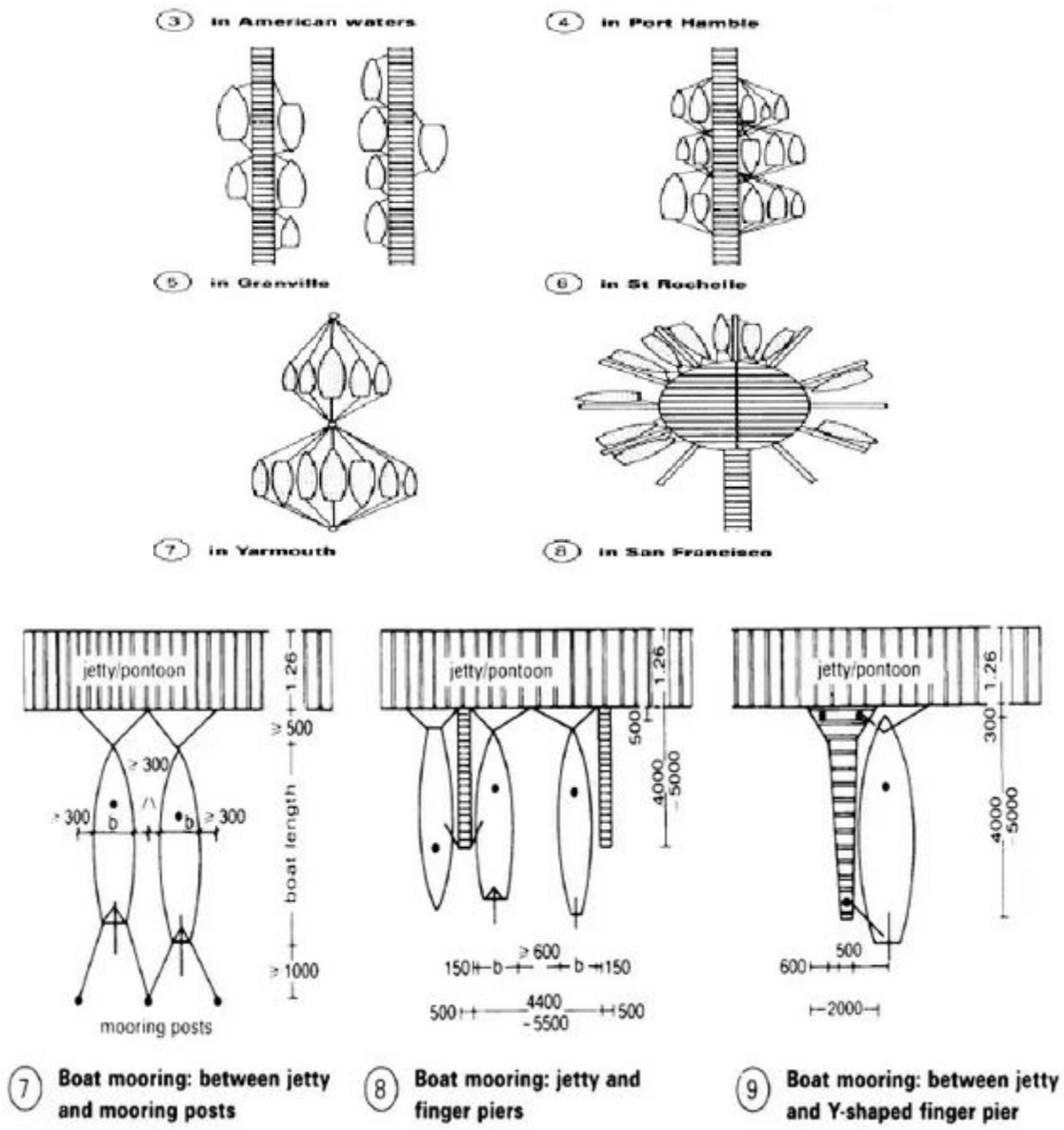


Fig. 2.4 Types of Mooring Facilities (source: Architect's Data 3rd Edition

Circulation patterns play an important role in arranging elements of a boat terminal because they embody both basic practical requirements and more abstract value systems. The circulation structure or trend formed inside and outside the terminal is critical in influencing people's perception and use of the terminal. Circulation patterns in every terminal should be easy and transparent. As a result, there is an immediate need to optimize the flow of foot and vehicular traffic, as well as to strategically place material handling facilities and parking. Addressing these circulation problems by systematic preparation and construction would increase Terminal use. Certain main criteria, such as vehicular and pedestrian circulation, must be considered for efficient circulation in a boat terminal.

3. GENERAL TRAFFIC PLANNING

It is important to ensure proper planning of the traffic pattern when designing a transport terminal as this will ensure ease and comfort of movement. The incoming traffic and outgoing traffic have to be separated as well as various types of traffic. The basic traffic types involved in a water transport terminal are:

1. Ferry traffic.
2. Vehicular traffic.
3. Pedestrian traffic.

1. Ferry Traffic

Ferry traffic should be effectively controlled to eliminate conflicts between arriving and departing ferries. Clearly demarcated arrival and departure side, it should be pointed out on the jetty or platform to ensure free flow of water traffic.

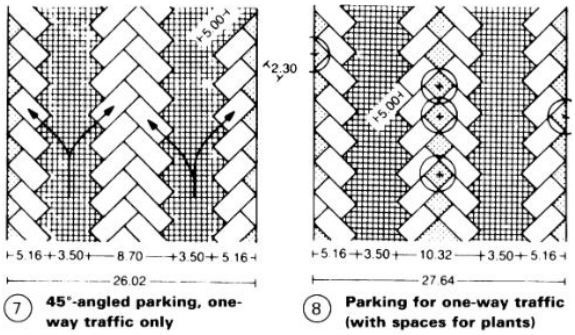
2. Vehicular Traffic: There are three types of vehicular traffic.

(i) Passenger traffic.

(ii) Traffic from employees.

(iii) Service traffic.

(I) *Vehicular passenger traffic*: Entry through the site: The access point must be strategically positioned to prevent traffic collisions. A drop-off point for passengers could be established to shield them from weather elements such as fog, sunshine, and so on. The vehicular traffic flow should be well organized and should be one-way traffic to ensure proper and orderly traffic movement through the venue.

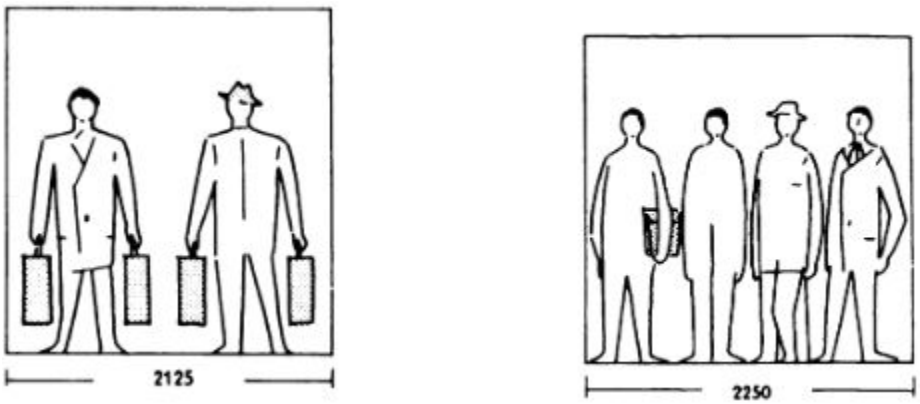


One way traffic parking arrangement, Source: architects data

(II)*Vehicular traffic from employees*: Staff parking will be offered in a different lot. Staff vehicular traffic must be connected to the rest of the commuter vehicular traffic. Vehicle traffic will be redirected away from the main road and guided to staff parking spaces, which will be situated near the terminal's staff entrance.

(III) *Vehicular service traffic*: The service vehicular traffic, should as much as possible be separated from the passenger vehicular traffic and should service directly those facilities like restaurant, retail shops, kitchen, stores, bar, etc. It should be properly designed to ensure that only the required vehicles use it and so that passenger vehicles do not accidentally use it.

(IV) *Passenger traffic:* Pedestrian flow through the site is crucial because it is responsible for a significant portion of passenger entry. Passenger entry can be built so that pedestrians have a fast and direct way into the terminal and that it can accommodate peak foot traffic.



Loading and grouping space needs Source: architects data

4. AN EXTENSIVE STUDY OF EFFECTIVE CIRCULATION IN BOAT TERMINALS

Circulation, as it is widely used in architecture, refers to the passage of persons and goods between interior spaces in buildings as well as to entrances and exits. Under regular and emergency situations, all buildings need safe, convenient, and rapid circulation. Such circulation can be channeled through a number of passageways, including lobbies, halls, stairs, stairways, and elevator hoist-ways. Circulations (movement of people and goods) inside interior spaces in a boat terminal are divided into two types: horizontal circulation and vertical circulation.

4.1 HORIZONTAL CIRCULATION

This circulation can be filtered through any of the different types of passageways, such as lobbies, doors, and halls. Horizontal circulation is the process of shifting or moving horizontally from one space to another through lobbies, doors, and corridors.

4.1.1CLASSIFICATION OF VERTICAL CIRCULATION SYSTEMS

Corridors: Corridors should be 1800mm deep and free of obstacles. Radiators and other devices, such as fire extinguishers, should ideally be recessed to ensure an unobstructed width of 1200mm. This reduces the possible danger that they can bring to many disabled persons, especially blind and partially sighted people. A sufficient tonal contrast should be given between the floor, walls, and ceiling. It can help blind and partly sighted individuals determine the scale and form of a space or hallway, as well as assist navigation.

Lobbies: Lobbies should be avoided unless absolutely necessary. A wheelchair should be able to move out of one door before using the next in an entry lobby and other internal lobby. Anyone helping a wheelchair user should also be able to move clear of one door before using the next. Floor mats should be securely fastened, close-fitting with no holes (if installed in a well), flush with the floor, and have a solid surface that does not get slick in wet weather. Mats made of close-grained rubber or short-fiber fibers are favoured. Mats with a soft core, rope, or metal attachment should be avoided.

Internal doors: Internal doors should have a simple opening range of at least 800mm. When entering from a hallway less than 1500mm deep and at a 90° angle, the visible opening distance of the door should be raised to 825mm. This is a minimal standard; doors with wider visible opening widths would be more accessible; a clear opening width of 900mm is recommended wherever possible.

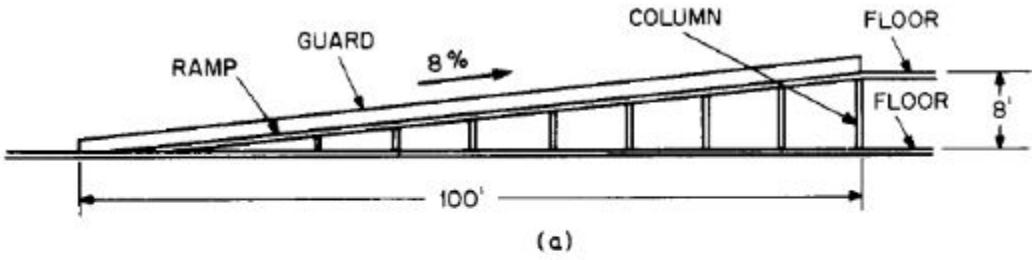
4.2 VERTICAL CIRCULATION

The vertical movement of traffic in a Boat Terminal building is critical to the design's performance, both in daily use and in emergencies. In fact, the placement of elevators or stairs has a major effect on the floor plan. As a result, when constructing a building, close consideration should be given to the type of vertical circulation to be offered, the number of units necessary, and their position, configuration, and architecture. In a multi-story building, traffic can travel from one floor to another through ramps, stairs, elevators, or escalators. When the generator is turned off, or there is a mechanical malfunction, or repair work is being done, or in an emergency, the driven machinery is often replaced by stairs. Other styles of human lifts, in addition to traditional elevators, are occasionally used in homes, warehouses, and garages.

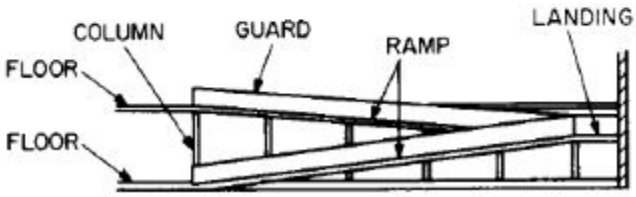
4.2.1 CLASSIFICATION OF VERTICAL CIRCULATION SYSTEMS

Vertical circulation systems are classified into two types. Class I systems, which include ramps, stairs, escalators and elevators, are meant for both persons and goods movement. Class II systems, such as dumbwaiters and vertical conveyors, cannot be used for people movement. Class I systems are split into two subclasses, A and B. People may use Class IA systems as a means of egress in both regular and emergency scenarios. This requirement for means of egress is specified in building codes or the National Fire Protection Association's "Life Safety Code."

Ramps: A sloping surface, or ramp, may be used to link various levels or floors when space allows. Any floor in some garages acts as a ramp in order to save space. Each floor is separated longitudinally, with each segment steadily sloping in opposite directions to reach the next level above and below. Ramps are particularly helpful for moving a large number of people or vehicles from one floor to another. As a result, they are commonly seen in public buildings such as railroad stations, arenas, and exhibition centers. And they are either legally necessary or highly desirable for all buildings, especially those that house people in wheelchairs.



(a)



Stairs: Stairs take up less space than ramps so steeper slopes can be used. The maximum stair slope for comfort is estimated to be 1 on 2 (27°), although this angle is often surpassed for practical purposes. Exterior stairs normally have a slope of 20° to 30°, while interior stairs have a slope of 30° to 35°.

Emergency egress stairway: Interior escape stairways in certain styles of buildings must be sealed with fire-resistant walls to prevent the transmission of smoke and fires. Wall construction and ratings must adhere to municipal code standards. Wall openings should be covered by permitted, self-closing fire doors. Stairs in buildings that are required by code to be of fire-resistant construction should be constructed entirely of noncombustible materials. Except for another flight of stairs, open space under stairs to be used as a means of egress should not be used for any reason, including closets.

Planning for escalators: The location of moving stairs should be selected only after a careful study of potential traffic flow within the planned project. They should be installed where most attractive to traffic and where convenient for passengers. The facility should be designed and signed in a manner that makes it apparent where the visitor will find the escalator. Since escalators are devices that will fail on occasion, the designer must provide alternative transportation (usually adjacent stairs) for times when the escalator is unavailable for passenger use. Wide areas should be provided at both the loading and unloading areas. When pedestrian traffic is limited below the escalator's capability in the direction of travel, careful attention should be given to the probability of a catastrophe arising from a confined escape from an escalator. Similarly, landing area preparation should take into account all queuing space and what happens when an escalator is delayed for whatever reason as foot traffic proceeds.

5. CONCLUSIONS & RECOMMENDATIONS

Poor circulation has been described as a unique architectural challenge of Boat Terminals; to address this problem, adequate vehicular and pedestrian flow would be provided outside and within the terminal, as the terminal complex incorporates a variety of both ground and water operations. Congestion of boat ports all too frequently leads to division in these terminals. There

is no unison or flow of circulation and each field of circulation is treated differently. However, by properly designing the environment so that it guides and manages circulation, this issue can be mitigated. The neglect or lack of construction of waterfronts in the Niger Delta and in general is a worthy cause. The use of facilities such as boat terminals is thought to aid in the popularity and patronage of this form of public transportation.

It is proposed that sufficient financial resources be allocated to the building of boat terminals in order to build the best-planned and most efficient boat terminals. Regulatory policies should also be in order to direct the running of these Boat Terminals.

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Biography

Dagogo Samuel Dima holds a B.Tech degree in Architecture from Rivers State University in Nigeria. He is currently undergoing his MSc program in architecture in Rivers State.

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