

Appraisal of Ferry Terminals Design Compliance to Guidelines for Universal Accessibility in Lagos State Nigeria

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Abstract: Accessibility of public buildings has been an issue of global interest and importance in the society in recent times. It has been promoted by the need to ensure universal equality and end discrimination of persons either based on size, ability and mobility disorder. Given the important role of water transportation in aiding mobility, movement of goods and services in coastal cities such as Lagos, this study reviewed the compliance of design, construction and operation of Ferry Terminals towards accessibility of users. The research adopts the case study approach and interviews in appraising the three existing Ferry Terminals in Lagos State, Nigeria for accessibility compliance. The case study involved observation and evaluation of the facilities, and the interviews focused on 18 of the 'facilities operators and passengers' about their experiences of associated facilities. Findings from the study revealed poor compliance to accessibility in both the external and internal environments. As such, there is a high degree of limitation in use of the facilities for all facets of water travel; from building approach; waiting, boarding and disembarking areas. Existing facilities have inadequate accessibility and are below standards to ensure use by all and without discrimination or segregation of users. It is therefore imperative for Ferry terminal buildings and amenities to be accessible in effectively enabling all users achieve true mobility in barrier-free environments that foster user-comfort through the adoption and application of universal design principles.

Keywords: Accessibility, Disability, Ferry Terminal, Universal Design

I. INTRODUCTION

Ferry terminals serve as exchange point for road and maritime transport, serving an important role in faster,

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lower cost alternative to bridges or tunnels linking points separated in coastal cities with a great portion of access to rivers, lakes and canals; with the ferries also help to remove large numbers of commuters from roads and thus reduce peak hour congestion in densely populated areas, where high frequency Ferry services are operational [1]. Given the diversity of user needs and abilities, the importance of accessibility has become crucial in creating inclusive environments for persons of all ages, sizes, ability and disability. The application of Universal design and accessible design to achieve accessibility in transport terminals avail tremendous benefits to all travelers, including people with disabilities and the aged[2]. Accessibility focused on non-discrimination for people with or without challenges [3]. It is a key element of good quality and efficient transport systems that are sustainable and that eliminate the inconveniences of persons with disability from moving around freely. With accessibility all users are able to benefit from easier access to all modes of transportation and associated facilities [4].

Water transport is acknowledged to account for over 1 million passengers monthly in Lagos state [5], from an estimated monthly ridership of 500,000 passengers in 2012 [6] it is expected to grow furthermore. Despite the increase in ridership and being acknowledged as a faster mode of transportation for long distance travels, the water transport system in Lagos has not been fully maximized for its potential as an alternative mean of public transportation. This paper therefore seeks to appraise the compliance of ferry terminals in the state to the guidelines for accessibility.

II. THEORY, CALCULATION AND METHODOLOGY

A. Concept of Accessibility

Accessibility can be described as the quality of having or obtaining goods and services as well as reaching destinations, most often interpreted by people to mean transportation [7]. It was summarily defined as absence of difficulty at arriving at destinations, which depends on factors such as land use distribution, travel time, cost and convenience, and individual characteristics and time restrictions of personal and scheduled transportation services [8], [9].

While the earlier definitions describe accessibility from the standpoint of transportation to geo-economic connection, Accessibility can also be interpreted according to needs of persons having certain disability or the other and the desire to create a universally, barrier-free environments. According to the definition by [10] which has also been adopted by the World Health Organization and on which this paper hinges on, accessibility is the relationship between physical or cognitive human capacity and being able to use the environment, as well as the demands from the environment on the user. They further explained this definition to mean that “restrictions on carrying out certain trips or movements can be either due to low individual capacity (a disability) or to large demands from the environment (big level differences, too steep ramps, no tactile guiding etc.)”.

B. Disability and Barriers in Design of Transport Terminals

Persons with disability are individuals who are unable to carry out or execute certain normal range of activities or may be restricted in certain ways from normal functioning. Common disabilities restrictions could be in form of partial or complete loss of vision, hearing loss or complete deafness, impairment in mental and or speech communication, lack of stamina and strength due to natural birth, ageing and structure either as a permanent or temporary impairment [11]. The United Nations international classification of functioning, disabilities health categorizes disability of individuals into five major categories of wheel chair users, people with limited walking abilities, the sightless, persons with partial sight and those with hearing impairment. It is however interesting that at some point in time of our various lives we all would experience some form of disability except for a few individuals who may be in good health all throughout their lives. This is aptly described by International Classification of Functioning, Disability and Health (ICFDH) which opined that disability should “not be seen as an individual’s intrinsic feature but a result of interaction in an environment. The interaction of the same person with the health condition may yield different functioning level in different environments.” [12]. More than one billion people in the world live with some form of disability [13]. In Nigeria, it is estimated that approximately 14 million citizens are disabled [14]. With increasing population growth and altered structure of family-work life, mobility has become very essential parameter of being fully functioning as a citizen [15]. However the common barrier faced by all users irrespective of ability or disability is summarized in a typical passenger journey cycle as indicated in Figure B.1.

According to a study conducted by [16], every passenger is first confronted with the arriving at the terminal, then purchasing transport ticket, finding desired of the available services, resting at the terminal for departure, on-boarding the transportation vessel bound for desired destination or off-boarding the transportation vessel on arrival at the desired destination. When a passenger is able to complete this cycle of trip chain, that is, “curb to terminal, terminal to vessel; vessel to terminal, terminal to curb” is when “true mobility” is said to be achieved [17].

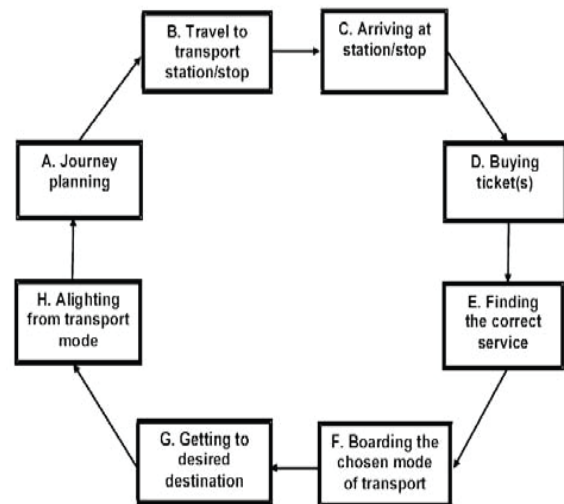


Figure B.1: Typical passenger journey cycle
Source: [16]

C. Policy Framework on Accessibility

Accessibility of public buildings and transport infrastructure although a constitutional necessity by the Nigerian Disability Decree of 1993, it has however been largely sidelined in implementation, planning and design of transport terminal buildings [18]. Thus persons with certain challenges or disabilities are denied rights, benefits and abilities from meeting the basic needs of life comfortably. The Convention on Rights of Persons with Disabilities (CRPD) by the UN was ratified in the year 2006 to address the inadequacies, that is, accessibility to economic, social, cultural and physical environments, so that there is no barrier to full enjoyment of fundamental human rights. [19]. In 2011, Lagos state government passed the Special People’s Law with a 5 year grace period to attain full compliance and enforcement of the law in 2016. The laws, amongst many objectives set out to protect persons with disabilities, enabling them enjoy a comfortable safe social, civil and cultural life [20]. One of the several provisions covered by the state Special People’s Law acknowledged right of persons with disability to necessary facilities to access public buildings and public spaces. This is to include the construction of accessibility aids such as mobility aids, guide canes, lifts and ramps. The Law also prescribes the modification of public buildings, roads, walkways to be accessible and useable by person with disability, while ensuring that 5percent of parks spaces are properly marked and reserved for persons with disability [20].

D. Universal Design

Universal Design (UD), was conceived in 1985 by Architect Ronald Mace. Since then, it has been widely adopted in diverse fields of design studies such as the built environment, engineering and product design [21].

Mace in his definition of universal design described it to be as designing environments and products for functional use of people notwithstanding their social status, ability or age [22]. UD, also described as “Design for All” by the European Union is defined by the [23], as “design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability”. UD drew its roots from the 1973 United States Act on Rehabilitation which approved to prohibit unjust treatment of persons based on their ability or disability. It has further been promoted by Disabilities Act in America (ADA) 1990 and Convention on persons with disabilities rights by UN, which made it morally or legally bound by States Parties to ensure their full enjoyment of “all human rights and fundamental freedoms” [24]. Universal Design is not only concerned about people with disabilities. Rather, it concerns the needs of everyone, people in diverse situations, different purposes and experiences and how solutions can be universally designed for benefit [25].

E. Universal Design Principles

In 1997, a 10-man committee from UD Center in North Carolina, United States identified the need for greater inclusiveness in design and put forward the seven underlying performance requirements of UD as flexibility in use, perceptible information, equitable use, simple and intuitive use, tolerance of error, space and size for approach and use, and low physical effort, all together known as Universal Design Principles [26]. The Equitable use principle requires the design to be useful, appealing to all users, marketable to persons with different abilities and eliminating segregation by ensuring provision of identical whenever possible; or equivalent when not. Flexibility in use takes into consideration a broad range of preferences and abilities by individuals to ensure the design is one that could be made suitable for pace of user(s) and also aid the user’ accuracy and precision [27], [28]. The principle of perceptible information hinges on the ability of a design to communicate using different devices, techniques or modes of presentation (pictorial, verbal and tactile media), necessary information to users irrespective of ambient conditions or differences in sensory abilities of the users [29]. Tolerance of Error makes adequate allowance for inaccuracy or inefficiency through the use of failsafe features and warning signs for hazards and errors, ensuring hazards and errors are isolated or shielded; as Low Physical Effort enables users to access features of the design environment with convenience and minimal stress or fatigue. Space and Size- for approach and use, as a principle ensures that every user has the ability to manoeuvre the environment and access any space without any difficulty as a result of spatial constraint [28].

F. Guidelines for Accessibility in Ferry Terminals

The Irish Department of Transport, Tourism and Sports in collaboration with the National Disability Authority prescribes the basic considerations critical to improving and developing high quality accessible spaces for users in maritime transport, to be a combination of outdoor and indoor facilities [30]. Outdoor facilities for consideration

include: quality of the pavement and road surface, provision of curb ramps sloped to provide easy access for wheelchair users and wheeled luggage, parking facilities and drop-off zones, shelter from weather elements, adequate lighting, security, use of floor markings and signage, seat provision, information delivery through a variety of formats (visual, audible, tactile), embarking and disembarking the vessels, general maintenance and cleaning. Indoor facilities for consideration in accessibility includes: access to and approach of the building; internal movement and spatial transition between levels, using elevators or escalators, footbridges and steps; ticketing points and machines; information points, refreshment and seating areas, luggage lockers and toilets and signage [30]. Detailed guide on how each of these considerations for accessibility in Ferry Terminals can be achieved are available in various codes for accessibility and universal design; with walkways, halls, paths, serving as access routes should be free of obstructions or protruding objects. [2], [31], [32]. According to [32],

“Pavement and road surfaces should be stable for safe walking, firm for maintaining balance, slip resistant and devoid of tripping hazards for the safety of persons with restricted gaits and wheelchair users. Curb ramps should be designed with minimum widths of 915mm sloping between elevated walkway and the ground, exclusive of the flared edges while accessible parking spaces for cars and vans should have access aisle to accommodate persons on wheelchair or other forms of mobility aid. Where passenger drop off zones are provided, they should be adjacent and parallel to the vehicle pull-up space. The international symbol of accessibility be displayed clearly to indicate accessibility of the facility while spaces within the building should be should clearly identified. Letter and numbers should be in upper case, sans serif or simple serif font with a minimum character, height of 75mm mounted at 1525mm above the finish floor level to the centerline of the sign. Internal transition between horizontal levels should be accompanied by resilient detectable warning surfaces that contrast in color from the surround floor surfaces. Stairs used for vertical transition should be preceded by detectable warning stripes and have uniform risers and uniform threads, with handrails on either sides. Accessible toilet provisions should have clear floor space, grab bars, and fixtures placed at convenient height to serve all users irrespective of size, age and ability”.

G. Methodology

The research design adopted in this study to appraise the ‘compliance of Ferry terminals in Lagos, Nigeria to standards for Accessibility’ is the qualitative involving case study (made up of observation and evaluation of the facilities) and interviews [33], [34] and [35]. A similar method was used by [36] - [38]. This is also opposed to [39], [40] [41] where quantitative (survey) was used. Multiple case sites were examined in the study which required physical visit to existing Ferry terminals for observation and documentation of existing features using sketches and photographs of existing Ferry terminals. Interviews with operators and commuters were conducted which also aided the critique, planning and design of the building.

Based on literature, for infinite population, sample size for questionnaire (with normal five-point Likert Scale, using standard sample size formula, alpha level of .05 for categorical variables and acceptance margin of error of .05) is 385 [42], [43]. The interview sample size requiring no adjustment is when it does not exceed five per cent of 385; which is 19 or less. Hence the sample size adopted for interview was 18.

The location of the Ferry terminals used in the study is Lagos state. Lagos is a coastal city situated between latitudes $6^{\circ} 23'N$ and $6^{\circ} 41'N$ and longitudes $2^{\circ} 42'E$ and $3^{\circ} 42'E$, southwest Nigeria. By having a cumulative landmass of approximately $3,345\text{km}^2$, Lagos happened to be the smallest state in the country occupying one-two hundred and fiftieth (or 0.4%) of Nigeria's total land area [44]. With direct access to the Atlantic Ocean and other inland water bodies, it has over 56 jetties forming the fulcrum of water transportation in the state, most of them mostly in various stages of neglect and decay [45]. Selection of the Ferry terminals used in the study from the several Ferry terminals in the state was dependent on those the authors were able secure permission for pictures and obtain relevant information needed for the research. It is pertinent to note at the time this study was conducted, the three ferry terminals built by the Lagos state government in Ebute-Ojo, Ikorodu and Ajah respectively, were yet to commence operation to the public since completion. For this reason they could not be considered in the study.

Site visits to the Ferry terminals used in study were conducted between the months of October 2017 and December 2017. Primary data collection involved qualitative data gathering done through personal observations, sketches and photographs of the existing situation for each of the ferry terminals studied. For secondary data used in the study, the authors relied on relevant articles sourced from quality journals, reports from renowned world bodies, documents from websites, Irish department of transport and the National Disability Association's developed Guidelines for accessible maritime passenger transport, as well as accessibility guidelines from other organizations and research centres.

III. RESULTS AND FINDINGS

A. Case Studies

The three Case Studies are Ikorodu Ferry Terminal, Ipakodo, Tarzan Ferry Terminal, Badore, Lagos and Ebute-Ero Terminal, Lagos. Relevant Figures (A.2 to A.16) are in Appendix 1.

Case Study 1: Ikorodu Ferry Terminal, Ipakodo, Lagos State

The Ikorodu Ferry terminal is located on the coastal waterfront of Ipakodo in Ikorodu, Lagos state, Nigeria. Situated in a densely populated residential zone off TOS Benson road, the terminal's location is next to the Nigerian Ports Authority lighter Terminal in Ikorodu. The operational route of the terminal serves majorly passengers who travel from Ikorodu to Badore, and those who commute the CMS-Apapa - Ikorodu route. As earlier noted, the Ikorodu terminal has a purpose built facility owned by the state

government, which was not yet opened to public access and use since its completion. However, the functional part of the Ikorodu terminal is run and managed by commercial ferry operators licensed by the Lagos State Waterways Authority. Access to the terminal from the major road is through a commercial shopping complex linking the waterfront where the terminal is located. The terminal has a large open area connecting to the jetty platform. The activities of the terminal: waiting area for departing passengers and visitors, ticket sales for departing passengers, food and drink sales by vendor are all conducted within the wooden shed structure of predominantly covered in aluminum roofing sheets with cut sections of translucent polycarbonate sheeting. During off peak periods, the boat sailors also utilize this space as resting area while waiting for passengers to arrive at the terminal and purchase Ferry tickets for departure.

It was observed on approach from the shopping complex that the floor was covered in interlocking stone tiles (Figure A.2). However, the car park, and the area where the terminal is located are covered in compressed laterite sand and stone filling (Figures A.3 and A.4); which is unstable and uneven for wheelchair users and persons with assisted mobility. The terminal has a large area for parking. However, it was observed that parking spaces were not clearly marked or identified for users and persons with disability, neither is there a clear demarcation between the parking area to the waiting area; making it safe for children and person with poor visibility, as it was observed.

Boarding the ferry vessel is through an elevated wooden access bridge (Figure A.5) which was observed to be unstable and impassable for users on wheelchair, children and elders with gait restrictions. It was also observed that there was no signage from the approach of the terminal giving direction to it, or within the terminal providing information to passengers on the next direction on their journey from the terminal to the vessel; prospective passengers were observed to be saddled with the burdened of asking for directions to the location of the terminal. The terminal has no ramp access to embark and disembark the vessel especially for people with mobility restrictions; passengers have to be physically able to climb off and on the ferry vessel (Figure A.6). The terminal does not have a toilet facility for users and passengers alike.

Case Study 2: Tarzan Ferry Terminal, Badore, Lagos State

Tarzan Boat and Ferry terminal, Badore is situated at the end of Catholic Street, off Ado Road in Badore, Lagos state. The Terminal is one of the two Ferry points along the Ajah-Badore coastline. The operational route of the terminal services passengers who travel on the Badore - Ikorodu - Ijede route and to Badore - CMS route. The terminal building is a single floor structure made of sandcrete blocks walls, wooden roof and window frames and glass louvered panels. The parking facility of the terminal was observed to be grossly inadequate for users due to the poor surface condition of the un-tarred, sandy and uneven ground which makes it uncomfortable and difficult to use persons by wheel chair users and other users with disability.

The terminal building has a simple layout of a waiting hall used as a ticketing sales point, departing and arrival point for passengers. The waiting hall is flanked by three offices to the right of the building and a store space located next to the main entrance. Approach to the terminal is through an asphalt paved surface road which terminates at the entrance of the building (Figure A.7); which was observed to be comfortable for pedestrian users and a passenger with complete blindness as at the time of the study. For safety of passengers, barriers were observed to have been erected to dissuade vehicular access to the entrance; which was being used as a drop off point by kiss and ride passengers. The Door way access into the terminal and the other spaces in the building are within the accessible standard of 815mm minimum width.

The interior of the terminal waiting area is lined with concrete benches (Figure A.8) covered with white ceramic tiles bonded by cement mortar; which is uncomfortable for prolonged sitting over a long period and also not adjustable for persons with disability that may require height adjustment of the seat to attain some level of comfort.

The Floor of the terminal is covered in non-slip vitrified ceramic floor tile, which is in line with accessibility guidelines (Figure A.9). The spaces of the terminal are also well lit with adequate light for users to locate access paths and engage in their activities. In the terminal building it was observed that signage was inadequate with only the 'Terminal name' indicated in an obscure location of the entrance while signage indicating direction of path, information guide to amenities and offices were all missing. The terminal does not have a toilet facility for users.

Access to the loading bridge from the terminal begins with a ramp and terminates with a short flight stair without guard rails on either sides of the stair (Figures A.10 & A.11); making it inaccessible to wheelchair users making a trip unassisted. The single loading bridge used by both departing and arriving passengers to connect the quay was observed to be accessible, meeting the minimum standard of 1525mm, however it was observed to be narrow during peak periods when both departing and arriving passengers were in rush to make their destinations.

A steel ramped access bridge was observed to be available for use to passengers to use in connecting to a floating pontoon that changes in height according to the rise and fall in sea level (Figure A.12) and as well makes it easy for able bodied passengers and persons with disability to embark and disembark ferry vessels; however, it was observed to be defective and riddled with holes expanding due to rust and lack of adequate maintenance.

Case Study 3: Ebute-Ero Terminal, Lagos State

The Ebute-Ero terminal is located in the metropolitan area of Lagos state. The terminal is situated along the Ring road next to the busy Ebute-Ero market in Lagos Island. It has direct access to the major highway connecting the Lagos CBD and direct access to the Lagos marina which flows into the Atlantic Ocean. The terminal serves passengers on the Ikorodu - Ebute -Ero - CMS and other nearby destination routes. The Ebute-Ero terminal is a single floor structure

consisting of two separate wings of offices lined with a corridor facing the Marina as shown in the Floor Plan (Figure A.13). Constructed using concrete, wood and sandcrete blocks, both buildings of the terminal have simple gable roof structure covered with fiber cement corrugated roofing sheets. The windows are of wooden frames with glass louvers insert while the doors are wooden framed panel doors. The terminal has a combined number of six offices in two building blocks. The offices are used by staff of the terminal and officers of waterways authorities in the state.

The location of the Ebute- Ero terminal makes it directly accessible to walk-on pedestrian traffic the major road, and the nearby Lagos Island BRT bus terminal. However, there is inadequate provision of vehicular parking spaces for park and ride passengers and users who may require accessible parking provision to effectively access the terminal. It was also observed that passengers with vehicles are forced to park in distant car parks owned by private organizations or occupy inappropriate parking space along the existing access road to the terminal, due to lack of parking spaces occupied by users of the Ebute market.

Identifying the terminal was observed to be extremely difficult due to lack of signage or directional symbol identifying the terminal (Figure A.14); which makes it an herculean task for first time visitors. The terminal has a simple layout and linear circulation path, leading from the road down to the jetty platform. The terminal floor area around the entrance leading to the administrative offices is covered with interlocking concrete blocks (Figure A.15), which were observed to have broken patches hazardous for children and pedestrian movement. The main entrance and administrative offices are connected to the landing quay only by a straight flight concrete stairs with metal hand rails on either sides conforming to the guidelines for accessibility (Figure A.16). This means that users on wheelchair can go no further into the terminal from the entrance, making it noncompliant to the accessibility guidelines. The size and space of the landing quay was observed to have ample space to accommodate easy movement and maneuvering of departing and arriving passengers. However, the loose security in the terminal permits unrestricted movement of person to the edge of the quay, which is dangerous for users with cognitive impairment who may have difficulty with spatial orientation. The existing toilet facility in the terminal was observed to out of use and in a dilapidated condition, a reflection of the overall maintenance of the terminal facility. The terminal does not have sufficient shading area for waiting passengers. Thus, passengers are left exposed to weather elements and harsh conditions while waiting for Ferry rides, which make the transport experience uncomfortable.

B. Interviews

Based on literature, interview guide was designed to elicit opinion of respondents on issues that reinforced the appraisal work.

Eighteen (18) persons made up of nine (9) operators and nine (9) commuters were interviewed. Ten (10) of them were males while the remaining eight (8) were females. Their responses to four (4) key aspects (General Issues, Design of Terminal, Satisfaction with Amenities and Satisfaction with Building and Environment) summarized in Table B.1 (Appendix 2) revealed that:

(i) Majority (over fifty per cent) of the respondents use the terminals frequently, attested to water transportation Shortening travel time when compared with road travel. They also have Swimming ability and with Capability of rescuing person(s) in case of accident(s).

(ii) On overall Design of Terminals and Surrounding Environment, only less than 43% of the respondents rated them Large while majority (over 57%) rated them at most fair.

(iii) On overall Satisfaction with Amenities, minority (only less than 7%) of the respondents were Highly satisfied while over 93% of them were at most only fairly satisfied.

(iv) On overall Satisfaction with Building and Environment, only minority (less than 19%) of the respondents were Highly satisfied while over 81% of them were at most only fairly satisfied.

C. Discussion

The study assesses the compliance of Ferry terminals in Lagos state, south west Nigeria to guidelines and standards for Accessibility as published by various accessible design organisations [2], [30] - [32]. Findings from the ferry terminals studied revealed gross inadequacies and noncompliance of the terminals and their existing amenities to standards for accessibility.

In accessing the approach, the terminals were moderately accessible with two of the terminals having hard, stable surfaces for easy movement of persons on wheel chair and passengers using walking aids (Figure A.16). In addition, all the terminals accessed in the study lacked accessible parking facilities, inadequate parking lots and dedicated pedestrian paths separate from vehicular path. Vertical transition between levels in the terminal was observed to be very convenient for able bodied persons with the provision of stairs as seen in Figures A.5, A.10, A.11 and A.12. There was no alternative provision in place for users with gait restrictions, mobility aids and wheelchair users to use the terminal unaided. The study also showed all three terminals had poor compliance in signage for communicating information and giving directional path to amenities both within and outside the terminal. As such passengers often encountered difficulties in locating the terminals and effectively utilizing the terminal as well. The study also reveals poor compliance from the considerations made for persons with sensory disabilities, partial or complete visual impairment no tactile floor or wall braille system was installed to cater for the needs of such passengers. While two of the Terminals had no accessible provision for embarking and disembarking of ferry vessels as seen in Figures A.5 and A.6, the only terminal was observed to have an accessible ramp for such purpose was found to be defective and impassable by a wheelchair user (Figure A.12). Lastly, all three terminals in the study had no

accessible toilet s for users of the terminal, a gross inadequacy when compared to accessibility compliance guidelines used in the study.

The findings from interviews seem to be in agreement with observations which revealed that Design of Terminals and Surrounding Environment were small in sizes and substandard. They were generally busier than the importance attached or attention given to them by government. The observed vessel capacity was between 20 and 30 passengers per ferry at the times the terminals were visited. Occasionally persons with mobility challenges and the visually impaired were seen assisted on-boarding and off-boarding ferries- these situations call for special care to ensure barrier-free utilization by all when new design proposals are made.

IV. CONCLUSION AND FUTURE SCOPE

A. Conclusion

Based on the studies conducted on the three ferry terminals used in this study, it can be observed that there is very low compliance to accessibility. This can be inferred that the needs of persons with disability were hardly recognized at the planning and initial design of stages of the ferry terminals in the state which were constructed before Special People's Law 2011 was passed by Lagos State government. Government of Lagos State was targeting two million passengers on water daily [46]. Given the strategic geographical location Lagos occupies as a coastal city, the role of water transport in the state cannot be over emphasized. Aside creating interesting waterfronts, making a design accessible is one of the simplest ways of increasing ridership of public transportation facilities by establishing an environment that ensures safety of pedestrian access while being convenient, and comfortable in use [47], for all users without regard for size, age, the challenged and the unchallenged.

Recommendations from this paper are as follows:

Given the state's legislation on disability known as the "Lagos state special people's law 2011" which became enforceable in 2016, it is expected that the state government would begin with complete retrofitting of existing ferry terminals in the state to ensure compliance to international best practices and standards of accessibility.

Architects and other designers, and 'Design and Build Contractors' should begin to place accessibility at the fore of necessary requirements that must be achieved in every ferry terminal design. Rather than accessible design feature being treated as an afterthought to the building, there should be a conscious design approach to achieving accessibility from the initial planning and design stage to building completion and programed maintenance to provide good service for all categories of users.

There should be strict enforcement of government legislation on accessibility to achieve compliance. Planning authorities and government institutions tasked with the responsibility of building design approval and construction supervision should monitor and enforce the integration of accessible design elements such as curb ramps, signage, railings, dedicated pedestrian and vehicular paths, and other design infrastructure in new Ferry terminals or retrofitting already constructed or existing terminals with all necessary requirements for ease of use by the people regardless of their ability, size, gender and age.

B. Future Scope

Future scope of research such as this subject can be made broader, by including Ferry Terminals in other States in the country with oceanic boarder. With such research design, which will involve sizeable number of such Terminals, the selection can be randomized- resulting in comparisons and general findings of wider acceptability. It can also include distribution of questionnaire in addition to the approach in this current study.

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Master of Science) Covenant University (2014) and obtained a professional Master's in Urban regional planning (MURP) from the University of Lagos, Nigeria (2018). Adedotun is currently working on his Ph.D in Housing. His research interests are in the areas of Energy Efficient Housing, Pro-poor Housing, Urban Resilience, Urban governance and Environmental justice He has published in some SCOPUS-indexed international journals.



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APPENDICES

Appendix 1

Table III A.1: Figures A.2 - A.16

Section III

Case Study 1: Ikorodu Ferry Terminal, Ipakodo, Lagos State

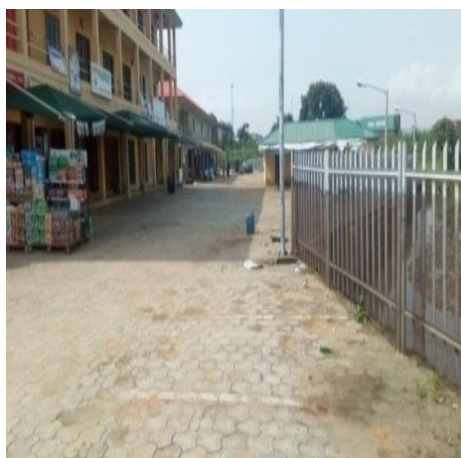


Figure A.2: Access route through the complex to the terminal

Source: Authors' Field work (2017)



Figure A.3: Car park area for passengers

Source: Authors' Field work (2017)

III



Figure A.4: Image of the passenger waiting area
Source: Authors' Field work (2017)



Figure A.5: Image of the loading bridge
Source: Authors' Field work (2017)

III



Figure A.6: Passenger embarking on the water vessel
Source: Authors' Field work (2017)

Case Study 2: Tarzan Ferry Terminal, Badore, Lagos State

III



Figure A.7: Approach View of the entrance to the Badore Terminal

Source: Authors' Field work (2017)



Figure A.8: Sketch floor plan of Tarzan Ferry terminal, Badore

Source: Authors' Field work (2017)

III



Figure A.9: Image of the snacks and drinks section of the terminal

Source: Authors' Field work (2017)



Figure A.10: Image of steps connecting the loading bridge to the terminal building

Source: Authors' Field work (2017)

III



Figure A.11: Image of concrete passenger loading bridge
Source: Authors' Field work (2017)



Figure A.12: Ramp access to floating platform
Source: Authors' Field work (2017)

Case Study 3: Ebute-Ero Terminal, Lagos State

III

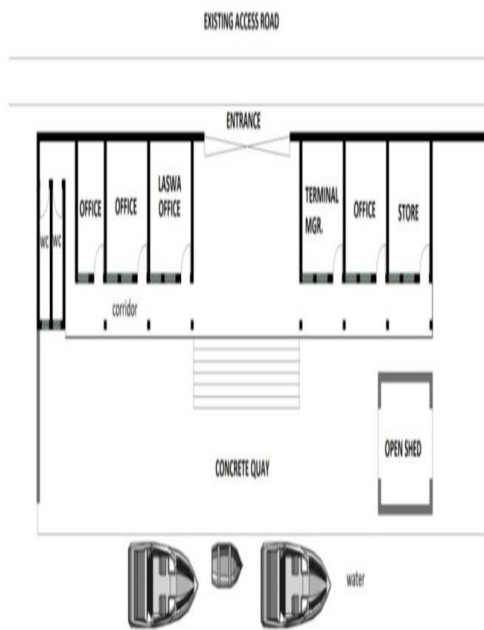


Figure A.13: Sketch plan of the Ebute-Ero terminal
Source: Authors' Field work (2017)



Figure A.14: View of the entrance and terminal's right wing from the access road
Source: Authors' Field work (2017)

III



Figure A.15: View from the entrance showing the office right wing section
Source: Authors' Field work (2017)



Figure A.16: view of the stairs linking the quay and main entrance to the access road
Source: Authors' Field work (2017)

Appendix 2

Table B.1: Summary of Responses to Interviews

	Description	Operators	Commuters	Summary
A	General Issues			
1	Usual arrival time at terminal	5-7 A.M. (9/9) 100.00%	6-10A.M. (9/9) 100.00%	5-10A.M. All (18/18) 100.00%
2	Usual departure time from last terminal on return journey back home	5-7 P.M. (9/9) 100.00%	3-7P.M. (9/9) 100.00%	3-7P.M. All (18/18) 100.00%
3	Peak period (based on experiential knowledge, information or discussion)	7-9 A.M. (9/9) 100.00%	7-10 A.M. (9/9) 100.00%	7-10 A.M. All (18/18) 100.00%
4	Peak period (based on experiential knowledge, information or discussion)	5-7 P.M. (9/9) 100.00%	4-7P.M. (9/9) 100.00%	4-7P.M. All (18/18) 100.00%
5	Loading or waiting time during peak period	Usually 10- 20 minutes All (9/9) 100.00%	Usually 15- 45 minutes All (9/9) 100.00%	Usually 10- 45 minutes All (18/18) 100.00%
6	Frequency of use of ferries: Monday- Friday	Badore- 10-20 Ebute Ero- 10-20 Ikorodu- 15-30 10-30 times daily- All (9/9)100%) All:) 1time or None (1/9)) 2 times daily (6/9)) 3 or more times daily(2/9) = 2 or more times daily (8/9) Majority (8/9) 88.89%) All:) 1time or None (1/18)) 2 -30 times daily (17/18) 2 -30 times daily (17/18) Majority (17/18) 94.44%
7	Frequency of use of ferries: Saturday- Sunday	 5-10 times daily- (9/9) All (9/9) 100%	Saturdays or Sundays- 1time or None (5/9) 2times (3/9) 3 or more times daily(1/9) = 2 or more times daily (4/9) Majority (4/9) 44.44%	Saturdays or Sundays- 1time or None (5/9) 2times (3/9) 3 or more times daily(1/9) = 2 or more times daily (4/9) 2-10 times daily- (13/18) Majority (13/18) 72.22%
8	Speed of travel	Satisfactory	Satisfactory	Satisfactory
9	Effect on travel time	Shortened travel time compared with road travel- All (9/9) 100%	Shortened travel time compared with road travel- All (9/9) 100%	Shortened travel time compared with road travel- All (18/18) 100%
10	Travelling time reduction	Three quarter to four-fifth (i.e. 120mins. road trip can be made in 30- 24 minutes)	Two-third to five-sixth (i.e. 120mins. road trip can be made in 40- 20 minutes)	Two-third to five-sixth (i.e. 120mins. road trip can be made in 40- 20 minutes)
11	Travelling time elongation	Nil	Nil	Nil
12	Swimming ability	Good- (9/9) All Good- (9/9) 100%	Poor or None- (5/9) Fairly well-(3/9) Good- (1/9) Minority Good- (1/9) 11.11%	Poor or None- (5/18) Fairly well-(3/18) Good- (10/18) Majority Good- (10/18) 55.56%

Appraisal of Ferry Terminals Design Compliance to Guidelines for Universal Accessibility in Lagos State Nigeria

13	Capability of rescuing person(s) in case of accident(s)	<i>Poor or Incapable (1/9)</i> <i>Fair (1/9)</i> <i>Good (7/9)</i> <i>Majority Good (7/9)- 77.78%</i>	<i>Poor or Incapable (4/9)</i> <i>Fair (2/9)</i> <i>Good (3/9)</i> <i>Minority Good (3/9) - 33.33%</i>	<i>Poor or Incapable (5/18)</i> <i>Fair (3/18)</i> <i>Good (10/18)</i> <i>Majority Good (10/18) – 55.56%</i>
B	Design of Terminals and Surrounding Environment			
14	Size of Terminal Building	Badore- Small (3/3) Ebute Ero- Fair (3/3) Ikorodu- Large (3/3) <i>Large- (3/9) 33.33%</i>	Badore- Small (3/3) Ebute Ero- Fair (1/3) Large (2/3) Ikorodu- Large (3/3) <i>Large- (5/9) 55.56%</i>	Badore- Small (6/6) Ebute Ero- Fair size (4/6) Large (2/6) Ikorodu- Large (6/6) Overall: Small (6/18) Fair (4/18); Large (8/18) <i>Large- 8/18 (44.44%)</i>
15	Size of waiting area	Badore- Small(3/3) Ebute Ero- Fair (3/3) Ikorodu- Large (3/3) <i>Large- (3/9) 33.33%</i>	Badore- None or Small (3/3) Ebute Ero- Fair (2/3) Large (1/3) Ikorodu- Large (3/3) <i>Large- (4/9) 44.44%</i>	Badore- None or Small (6/6) Ebute Ero- Fair (5/6) Large (1/6) Ikorodu- Large (6/6) Overall: Small (6/18) Fair (5/18); Large (7/18) <i>Large- (7/18) 38.89%</i>
16	Size of surrounding environment	Badore- Small (3/3) Ebute Ero- Fair (3/3) Ikorodu- Large (3/3) <i>Large- (3/9) 33.33%</i>	Badore- None or Small (3/3) Ebute Ero- Fair (3/3) Ikorodu- Large (3/3) <i>Large- (3/9) 33.33%</i>	Badore- None or Small (6/6) Ebute Ero- Fair (6/6) Ikorodu- Large (6/6) Overall: Small (6/18) Fair (4/18); Large (8/18) <i>Large- (6/18) 33.33%</i>
	<i>Design of Terminals and Surrounding Environment</i>			Overall: Small (18/54) Fair (13/54); Large (23/54)= Small (6/18) Fair (4.33/18); Large (7.67/18) <i>Minority Large (7.67/18) 42.61%</i>
C	Satisfaction with Amenities			
17	Waiting area	Badore- Low (3/3) Ebute Ero- Low (2/3) Fair (1/3) Ikorodu- Low (2/3) Fair (1/3)	Badore- Low (3/3) Ebute Ero- Low (2/3) Fair (1/3) Ikorodu- Low (2/3) Fair (1/3)	Badore- Low (6/6) Ebute Ero- Low (4/6) Fair (2/6) Ikorodu- Low (4/6) Fair (2/6) Overall: Low (14/18) Fair (4/18); High (0/18) <i>Minority High (0/18) 00.00%</i>
18	Restaurant	Badore- Low (3/3) Ebute Ero- Low (2/3), Fair (1/3) Ikorodu- Low (3/3)	Badore- Low (3/3) Ebute Ero- Low (2/3) Fair (1/3) Ikorodu- Low (3/3)	Badore- Low (6/6) Ebute Ero- Low (4/6) Fair (2/6) Ikorodu- Low (6/6) Overall: Low (16/18) Fair (2/18); High (0/18) <i>Minority High (0/18) 00.00%</i>
19	Toilet facilities	Badore- Low (3/3) Ebute Ero- Low (2/3), Fair (1/3) Ikorodu- Low (3/3)	Badore- Low (3/3) Ebute Ero- Low (2/3) Fair (1/3) Ikorodu- Low (3/3)	Badore- Low (6/6) Ebute Ero- Low (4/6) Fair (2/6) Ikorodu- Low (6/6) Overall: Low (16/18) Fair (2/18); High (0/18) <i>Minority High (0/18) 00.00%</i>
20	Parking Space	Badore- Low (3/3) Ebute Ero- Low (2/3), Fair (1/3) Ikorodu- High (3/3)	Badore- Low (3/3) Ebute Ero- Low (2/3) Fair (1/3) Ikorodu- Fair (1/3); High (2/3)	Badore- Low (6/6) Ebute Ero- Low (4/6) Fair (2/6) Ikorodu- Fair (1/6) High (5/6) Overall: Low (10/18) Fair (3/18); High (5/18) <i>Minority High (5/18) 27.78%</i>
	<i>Overall Satisfaction with Amenities</i>			Overall: Low (56/72); Fair (11/72); High (5/72) Low (14/18); Fair (2.75/18); High (1.25/18) <i>Minority rated High (1.25/18) 6.94%</i>
D	Satisfaction with Building and Environment			
21	Building facility	Badore- Low (1/3) Ebute Ero- Low (1/3) Fair (1/3) High (1/3) Ikorodu- Low (2/3) Fair (1/3)	Badore- Low (3/3) Ebute Ero- Low (1/3) Fair (2/3) Ikorodu- Low (2/3) Fair (1/3))	Badore- Low (4/6) Fair (2/6) Ebute Ero- Low (2/6) Fair (3/6) High (1/6) Ikorodu- Low (4/6) Fair (2/6) Overall: Low (10/18) Fair (7/18); High (1/18) <i>Minority High (1/18) 5.56%</i>
22	Surrounding environment	Badore- Low (3/3) Ebute Ero- Low (2/3) Fair (1/3) Ikorodu- Low (2/3) Fair (1/3)	Badore- Low (3/3) Ebute Ero- Low (2/3) Fair (1/3) Ikorodu- Low (2/3) Fair (1/3)	Badore- Low (6/6) Ebute Ero- Low (4/6) Fair (2/6) Ikorodu- Low (4/6) Fair (2/6) Overall: Low (14/18) Fair (4/18); High (0/18) <i>Minority High (4/18) 00.00%</i>
23	Safety of life and property	Badore- Low (3/3) Ebute Ero- Low (2/3) High (1/3) Ikorodu- High (3/3)	Badore- Low (2/3) Fair (1/3) Ebute Ero- Low (1/3) High (2/3) Ikorodu- High (3/3)	Badore- Low (5/6) Fair (1/6) Ebute Ero- Low (3/6) High (3/6) Ikorodu- High (6/6) Overall: Low (8/18) Fair (1/18); High (9/18) <i>Majority High (9/18) 50.00%</i>

	Overall Satisfaction with Building and Environment			Overall: Low (32/54) Fair (12/54);High (10/54) =Low (10.67/18) Fair (4/18); High (3.33/18) Minority rated High (3.33/18) 18.52%
Ferry Terminals: Badore: Tarzan Ferry Terminal, Badore, Lagos State; Ebute Ero: Ebute-Ero Terminal, Lagos State; and Ikorodu: Ikorodu Ferry Terminal, Ipakodo, Lagos State				
Note: Responses to interviews were interpreted and scaled where necessary for comparison Ordinal scales: 1.Poor, 2. Fair or not sure and 3. Good; 1.Small, 2. Fair or not sure and 3. Large; 1.Not Available, 2. Fair or not sure and 3. Available				