Application of Therapeutic Architectural Principles in the Design of Drug Rehabilitation Centre for Nigeria

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Abstract: **In order to achieve lifetime abstinence from illicit drugs and psychoactive substances, drug de-addiction and rehabilitation now endeavors to provide emotional support along with medical care, rather than aiming at removal of physical dependences on drugs only. When a drug addict is released from a Detention Camp, he/she is reintegrated back to the society as liability with high temptation to relapse, due to the ineffectiveness of the detention strategy and gross inadequacy of drug treatment and rehabilitation services in Nigeria, as Programs like Detoxification, Psychotherapy and Meditation are absent. The purpose of this study therefore is to explore the principles of therapeutic architecture towards designing a therapeutic environment, with a view to support the new treatment trend for drug addicts and thugs in Bauchi state- Nigeria. The method applied in this study is basically qualitative, using Multiple Case Study approach. Cross Case Analysis was used to analyze the data collected. This study identified 12 principles of Therapeutic Architecture and was able to determine the best mode of application for the design of the Rehabilitation Centre. The findings of this study showcase Architecture in aiding therapy for drug addicts and thugs, by creating a therapeutic environment that addresses the problem of relapse and inadequacy of the treatment facility in the study area, which ensures reintegration of addicts back to the society within the shortest possible time with minimal professional intervention.**

Keywords: **Therapeutic Principles, Architectural Design, Rehabilitation Centre, Healing**

I. INTRODUCTION

Youths as drug addicts in Nigeria, have been neglected by the successive administrations (military and civilian) since independence [1]. This situation has escalated in the last decade due to the conversion of youth by political masters into drug addicts, and subsequently metamorphosed into political thugs, political assassins, armed bandits, drug pushers, especially in North-eastern Nigeria. Thugs in Bauchi bear the local name "Sara-suka" [1]. According to [2] in his assessment of Political violence and youth gangs in Bauchi state, *Sara-Suka* comprises mainly of youths between the ages of 15 – 35 years, who are single, unemployed and vulnerable to drug abuse and thuggery.

A national survey [3] has confirmed that in the year 2017, nearly 15% of the adult population in Nigeria (around 14.3 million people) reported a "considerable level" of use of psychoactive drug substances. This rate is alarming for a developing nation like Nigeria. The survey further revealed that the highest level of drug used was recorded among people aged; between 25 to 39 years, with Cannabis being the most widely used drug. At present, most of the youths (Drug Addicts) are forcefully detained in National Drug Law Enforcement Agency (NDLEA) detention camps and prisons across the country, with the aim of removal of physical dependence on drugs only, in an un-conducive environment, after which the detainees are reintegrated back to the society as liabilities and easily get back to drugs and thuggery. This is in line with the findings of [4] on their sociological assessment of the NDLEA's arrest and detention strategies, which were found to be ineffective for any meaningful narcotic drug control and addicts' rehabilitation in Nigeria. Study on drug use in Nigeria by the United Nation Office on Drugs and Crimes (UNODC), revealed a gap in meeting the needs for treatment and care for people with drug use disorders across the country. Two-third of high-risk drug users reported a self-perceived need for drug treatment. About 40% of those who wanted to receive drug treatment, were unable to access such services. The cost of treatment, stigma associated with accessing such services as well as stigma associated with substance use in general, and unavailability of adequate drug treatment services were the major barriers in accessing drug treatment in Nigeria [3]. Based on the aforementioned problems, therapeutic architecture is encouraged to bridge the gap, by proposing a design of Rehabilitation Centre, where the facility itself will be complementary to the overall healing and learning process. This study presents the underlisted principles of therapeutic architecture from the findings of previous scholars in the field of therapeutic architecture and drug addiction rehabilitation, for adoption in the design of drug rehabilitation center in Bauchi-Nigeria. The major design principles are explained as follows;

i. Harmony of the Built-up Structures with the Natural Environment:

This principle proposes that a therapeutic rehabilitation center project aims to blend with its surroundings to create a sense of peace and relaxation. Nature is a strong aspect to the master plan, and the design should attempt to bring the natural environment inside the patients that occupy the healthcare facility as manifested in the design of Rehabilitation Centre Groot Klimmendaal by [5].

ii. Exposure of the Built-up Structures to Natural Daylighting, Ventilation and View of Nature:

According to [6], the impact of physical environmental elements on users of the healing environment have shown that rooms with ample light and ventilation are proved to have positive effects on patients than those without. The study further revealed those architectural designs that incorporate

natural aspects such as in-built and exterior landscape to have significant therapeutic effects on mental patients.

iii. Principles of Privacy/Access Control, Pleasing Smell and Color Application:

Architectural manipulation of structures and space can allow for other environmental factors such as sound, color, views, smell and light all of which contribute to a therapeutic environment to be prominent for healing purpose [7]. All these are agreed by the experts, to be good for use in the design of mental health care facility/Rehabilitation Centre.

iv. Isolation from Negative Distraction and Application of Positive Attractions:

According to [8] in his study of Exploring Therapeutic Architecture and its Integration into Addiction Rehabilitation, Past and present models of healing centers advocate the isolation of people from society with the intention of replacing the undesirable distractions associated with an urban lifestyle with the more desirable/attractive effects of the rural one, which is believed to increase the rate of healing of addicts.

v. Principle of Building Appearance:

It is believed that there are ample ways to infuse homelike environment for mental patients, as today's patient is someone who wants to return and stay in their home. Therefore, designing familiar surroundings and including objects that can vividly replace an institutional feel to one's home experience is considered in rehabilitation center design, as "First impressions are key to a home-like atmosphere" [9]. Tammy Althoff also believes that, rehabilitation spaces should feature finishes and products that are more residential than institutional, including warm colors, natural lighting, and inviting areas for seating and recreation [9]. Studies have further shown that, providing home-like characteristics is widely recommended as best practice design for mental healthcare and long-term care facilities. A study by [10] in a Norwegian psychiatric ward found that decorating a seclusion area in a home-like increased the satisfaction and reported well-being of patients [10]. Another study of a renovated club, hospital wing, and facility built for drug and alcohol treatment by [11] found that, satisfaction declined with all three facilities progressively during the 4-week treatment period due to absence of familiar home features. According to [12] For the fact that most mental health facilities are denied of minimum amenities and home-like features, the addicts residing for long periods of time in these facilities are often in sleep or suffer from boredom, depression and fatigue. All the above cited studies agreed with reducing the institutionalized appearance of rehabilitation facility, with some experts having a view of denouncing the institutionalized appearance by making the facility looks residential or home-like.

vi. Application of Relaxation/ Recreational Facilities:

From the findings of [13], in his research on Architecture of Drug Addiction Rehabilitation, some implementations from the precedent studies which are adopted in his research work includes featuring recreational facilities in the form of indoor and outdoor facilities for the addict's undergoing rehabilitation. In addition, the studies further proposed the use of special recreational facilities that are accessible to both the addicts under parole and selected members of the community with the aim of preparing the addicts for gradual reintegration back to the society. Which make it a good one for consideration under this study.

vii. Application of Art Work:

A study was established on the relationship between art displays and patient anxiety in an acute-care psychiatric unit, the study found a significant positive correlation between presence of realistic art displays and anxiety reduction as cited by [14] in their study on Effects of visual art on patient anxiety and agitation in a mental health facility.

Based on the above studies and findings by previous researchers, it is evident that the principles so far established are best for use in the design of rehabilitation center. The observation checklist designed for this study had captured all the aforementioned principles and were used in the proposed design of the rehabilitation center for this study.

II. METHODS

This study was designed in line with the case study research design, using qualitative approach of data collection and analysis. The non-probability sampling used was purposive. Information was obtained through observation, sketches and photographs, from specific rehabilitation facilities. Kano State Reformatory Institute, Kiru and Ibrahim Sani Abacha Rehabilitation Centre, Bauchi were locally selected by the virtue of their availability around the study area. Groot Klimmendaal Netherlands, Sister Margaret Smith Addictions Treatment Centre, Canada and VA Palo Alto Rehabilitation Centre, California were purposely selected for international case study by the virtue of their standard and relevance to the study. Data collection was done considering what had been achieved and how the techniques and principles of the Therapeutic Architecture are been applied in the design and construction of the selected treatment Centers. During the observation, photographs and sketches were taken. The checklist of the observation comprises the principles of therapeutic architecture. The data obtained were ranked using the adopted scale of (Zero (0) = Poorly applied to four (4) = excellently applied) to show the extent of application of each of the principles in the Five Facilities studied.

III. RESULTS

Table 1: Images of Various Sections of the Five Rehabilitation Facilities Studied

CASE STUDY-1	CASE STUDY-2	CASE STUDY-3	CASE STUDY-4	CASE STUDY-5
 	 	 	 	 
Images From Kano State Reformatory Institute Kiru	Images From Ibrahim Sani Abacha Rehabilitation Centre Bauchi	Images From Rehabilitation Center Groot Klimmendaal, Netherlands	Images From Sister Margaret Smith Addictions Center, Canada	Images From VA Palo Alto rehabilitation center, California

Table 1 presents photographs of the applications of various principles of therapeutic architecture across the case study areas, and the extent to which these principles are applied in the design and construction of these facilities is presented in Table 2.

Table 2 shows the Cross-case analysis of the Five case studies undertaken based on the established principles of therapeutic architecture. From the Table, the level of application of each of the principles across the Five case study areas, ranging from Zero (0) =Poor, one (1) =Fair, two (2) =Good, three (3) =Very Good to four (4) =Excellent. The Excellent Applications were selected from the Table and harmonized to form Architectural Solutions for the design problem for adoption in the proposed design of the rehabilitation center under this study. The results are supported with the photographs in table 3.

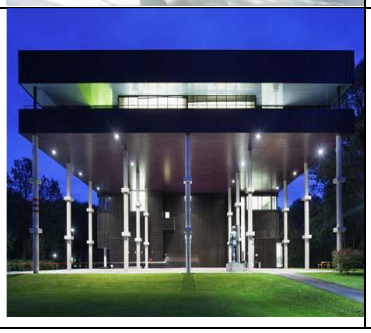
Table 2: Cross case Analysis of the Observation Data Collected across the Five Rehabilitation Centers

S N	PRINCIPLES OF THERAPEUTIC ARCHITECTURE	REHABILITATION FACILITIES STUDIED				
		CASE STUDY-1	CASE STUDY-2	CASE STUDY-3	CASE STUDY-4	CASE STUDY-5
		Kano Reformatory Institute Kiru	Ibrahim Sani Abacha Rehabilitation Centre Bauchi	Rehabilitation Center Groot Klimmendaal, Netherlands	Sister Margaret Smith Addictions Treatment Center, Canada	VA Palo Alto rehabilitation center, California
		Level of Application 0 1 2 3 4	Level of Application 0 1 2 3 4	Level of Application 0 1 2 3 4	Level of Application 0 1 2 3 4	Level of Application 0 1 2 3 4
I.	**Harmony of the Built-up Structures with the Natural Environment**	Fair	Fair	Excellent	Very good	Very good
II.	**Exposure of the Building/Users to Natural Day Lighting**	Good	Good	Excellent	Very good	Very good
III.	**Exposure of the Building/Users to Natural Ventilation**	Good	Very good	Excellent	Very good	Very good
IV.	**Exposure of the Building/Users to View of Natural Green**	Good	Very good	Excellent	Very good	Very good
V.	**Isolation from Negative Distraction/**	Good	Poor	Excellent	Very good	Excellent

	Application of Positive Attractions					
VI.	**Privacy/Access Control**	Very good	Fair	Excellent	Very good	Excellent
VII.	**Building Appearance**	Fair	Good	Very good	Very good	Good
VIII.	**Pleasing Smell**	Fair	Fair	Very good	Very good	Excellent
IX.	**Provision of Relaxation/ Recreational Facilities**	Good	Poor	Very good	Good	Very good
X.	**Color Application**	Poor	Poor	Excellent	Very good	Very good
XI.	**Application of Art Work**	Poor	Poor	Very good	Good	Excellent

Table 2 shows the results obtained on the level of applications of the Eleven (11) principles of therapeutic architecture across the Five (5) Case study areas. For each principle, the highest grade of application is selected as the best application. Where the highest grade is more than One for a particular principle, the Two or more methods of application are harmonized to form the Architectural Solutions for adoption in the proposed design of the Rehabilitation Centre under this study.

Table 3: Selection of Best Applications and Formulation of Architectural Solutions for Adoption in the Proposed Design of the Rehabilitation Centre

S/N	Principles	Best Applications	Mode/Method of Application	Images from the Case Studies	Architectural Solutions for Adoption in the Proposed Design
I.	Harmony of the Built-up Structures with the Natural Environment	Excellent application was observed on Casestudy-3	The facades of the building despite its size, makes the building dissolve within its surroundings. This is achieved by the use of brown composite aluminum on the facades to blend with the back of the trees in the forest, and the use of transparent glasses to invite the forest into the building.		The design should incorporate the natural elements on site such as green plants (grasses, shrubs & trees), the outcrop, the water body etc. in the overall design of the rehabilitation facility.
II.	Exposure of the Building/Users to Natural Day Lighting	Excellent application was observed on Casestudy-3	This is achieved through the use of curtain walls, double volume spaces and generous glass use on the façade.		The design should adopt the use of courtyards, large openings for doors, windows, and passages, use of curtain walls (with transparent glasses), double volume spaces, etc.
III.	Exposure of the Building/Users to Natural Ventilation	Excellent application was observed on Casestudy-3	The use of open courtyards, building orientation and direction & sizes of window openings and the pure oxygen coming from the green environment surrounding the building.		The design should adopt building orientation along the east-west axis, the use of larger openings (especially windows) targeting the north-east & south-west Tradewinds, and creation of micro-climate within the site using green plants.
IV.	Exposure of the Building/Users to View of Natural Green	Excellent application was observed on Casestudy-3	The view of nature's inherent beauty is achieved though the curtain walls and generous glass use on the façade. It invites the surrounding landscape into the building, giving its user a constant view of nature.		The design should adopt the use of courtyards as much as possible, large openings for windows, curtain walls (with transparent glasses) on the façades, double volume spaces, and use of therapeutic gardens around the built-up structures within the site.
V.	Isolation from Negative Distraction/ Application of Positive Attractions	Excellent applications were observed on Casestudy-3 & 5	The facility is located inside forest, proper site organization, zoning of functional spaces at different levels and access control to the visitors. Application of positive distraction is achieved through the attractiveness of the architectural manipulation of spaces within the center.		This should be achieved through site location as described above, restriction of access to drugs and peer groups. Also, the attractiveness of spaces is achieved through painting of emotional images on wall, systematic selection and application of colors that have psychological effects on the patients' recovery, use of green plants to beautify the environment, use of leisure/ recreational facilities etc.

VI.	Privacy/Access Control	Excellent applications were observed on Casestudy-3 & 5	Absolute privacy is achieved by siting the building in the forest and restriction of vehicular and pedestrian access.		The design should restrict unwanted access and views to the patients by the public. Only designated functional spaces (such as reception, admin, outpatient clinic, initial assessment unit etc.) that are classified under public spaces should be accessed by the visitors and out-patients.
VII.	Building Appearance	Very Good applications were observed on Casestudy-3 & 4	On approach, the building looks institutional, but welcoming to its users.		The design should be welcoming right from the approach of the facility. This should be achieved by reducing the institutionalized appearance of the building and making it welcoming and acceptable by the users. Also, a home-like appearance is suggested by many researchers for use in the design of rehabilitation facilities, which our design is very interested in.
VIII.	Pleasing Smell	Excellent application was observed on Casestudy-5	The center uses the green environment (comprising of different plant species) such as trees, ground covers, decorative hedges etc., and adequate air circulation and ventilation within and outside the building envelope to achieve a good pleasing smell	 	The design should adopt the use of therapeutic gardens especially around the dormitories, clinics, relaxation and recreational facilities, using different flowering plants that give different colors of flowers with different fragrances such as Pandan fragrance, lemon plants, night blooming fragrant flowering plant, sun flowering plant, grapes plant etc. Thereby creating, a microclimate with adequate air that smells good to the patients/users.
IX.	Use of Relaxation/ Recreational Facilities	Very Good applications were observed on Casestudy-3 & 5	By provision of world-class indoor and outdoor sporting/ recreational facilities at the Centre, and open spaces for relaxation		The design should adopt the use of therapeutic gardens as described above, and sporting facilities such as Indoor Gymnastic Hall, Indoor and Outdoor Swimming Pools, Football Pitch, Basketball and Volleyball Courts etc. for fitness and physiotherapy.
X.	Color Application	Excellent application was observed on Casestudy-3	The Centre implements visual art such as painting, photographic displays, and application of diverse array of colors and shades in its interiors, creating a visually arousing yet comforting environment.		The design should allow for painting and photographic display of emotional images on walls along corridors, passages and patients converging points within the building envelope. And also, systematic selection and application of colors that have psychological effects on the patients' recovery.
XI.	Application of Art Work	Excellent application was observed on Casestudy-5	There is Artwork/painting on the walls around the horizontal circulation areas, and provision of some Ornamental Elements within the public and private gardens at the Centre.		The design should adopt the use of Sculptural Elements such as stone walls, ceramic water fountains, wood loungers/sculptural bench, structured shrubs and hedges etc. within the gardens and the overall landscape, as well as Motivational Wall Arts as described above.

Table 3 shows the applicable principles of therapeutic architecture and the best mode of application selected for each principle for adoption in the design of the rehabilitation center.

For the purpose of the design, this study intends to express the principles architecturally in the course of the design, putting more emphasis on the principle of Building Appearance/minimizing institutionalized appearance as opined by [15]. This was achieved in this study by featuring a typical Hausa traditional hamlet using the Hausa traditional architectural elements such as the pyramidal thatch roof, pinnacles, pointed arches, traditional spouts in the midst of

Baobab and Date Palm Trees etc. to create a typical home-like environment right from the first impressions, buttressing the opinions of [9], [10], [11] and [12].

Table 4: Selected Principles of Therapeutic Architecture for use in the proposed design and the methods in which they are applied

S/N	PRINCIPLES OF THERAPEUTIC ARCHITECTURE	METHODS OF APPLICATIONS
i.	Harmony of the Built-up Structures with the Natural Environment	by incorporating the existing physical features like the outcrop, trees, water bodies in the design
ii.	Exposure of the Building/Users to Natural Day Lighting/Ventilation	by use of large courtyards, large openings, curtain walls, generous glass use and building orientation
iii.	Exposure of the Building/Users to View of Nature	by use of Curtain walls on the large openings, generous glass use and incorporating gardens around the courtyards
iv.	Isolation from Negative Distraction	by locating the site in isolated/remote environment away from urban distractions
v.	Application of Positive Attractions	by making the environment aesthetically pleasing to users through design
vi.	Privacy/Access Control	by proper zoning of functional spaces and access restrictions through design
vii.	Building Appearance/minimizing institutionalized appearance	this is achieved by making the facility looks residential, using Hausa traditional architectural elements
viii.	Provision of Relaxation/Recreational Facilities	By Provision of Gym, pools, indoor and outdoor Sporting facilities
ix.	Pleasing Smell	Through Landscape Architecture, using different plant species and ensuring adequate air circulation in and out of the facility

Other principles such as Application of Artwork (painting of emotional images on walls) and color application in the interior are not expressed architecturally in the Design of Drug Rehabilitation Centre for this study, as such, the design was restricted to the application of the principles (i-ix) depicted in Table 4 as depicted in Figure 1 below.

Figure 1: Proposed 3D Design of Bauchi State Rehabilitation Centre, Bauchi

IV. DISCUSSION OF RESULTS

From Table2 (Cross Case Analysis) above, case studies carried out to determine the level and mode of application of the established principles in the design of rehabilitation facility revealed much about the extent to which the existing rehabilitation facilities had attained in terms of the application of the Therapeutic Principles in the design and construction of the existing facilities. And how the neglect of most of the principles, especially in Casestudy-1&2 proved the inefficiency and inability of the rehabilitation facilities to complement the healing and rehabilitation process.

The case studies revealed different modes and levels of application of the therapeutic principles, featuring the best applications for each of the principles. The highest mode of application for each of the principles is selected on each row as explained in the Table 3 (Selection of Best Applications and Formulation of Architectural Solutions) above.

The Table 3 showcases the selected best applications of the therapeutic principles extracted from Table 2, with the introduction of Architectural Solutions for adoption in the design of the Rehabilitation Centre. The Architectural Solutions are formulated by harmonizing the best applications for each of the principles (I-XI) and localizing the application to suit the context of this study as shown in Figure 1 and 2 above.

V. CONCLUSION AND RECOMMENDATIONS

The study aimed at applying the principles of therapeutic architecture in the Design of Drug Rehabilitation Centre for Bauchi State Nigeria, with a view to use design to compliment the rehabilitation process. From the case studies conducted, most of the therapeutic principles were best applied in the foreign rehabilitation facilities especially the Rehabilitation Center Groot Klimmendaal, Netherlands.

The study therefore concludes that the method/mode of applications of the identified principles were determined by observing how the principles were applied in the design and construction of the various rehabilitation facilities studied, where the best applications were established, and the best applications drawn from the case studies were generalized into architectural solutions for adoption in the proposed design of the rehabilitation center. For the fact that the design throws more emphasis on localizing the building appearance to depict a typical Hausa traditional setting, featuring some Hausa traditional building elements such as the pyramidal thatch roofing style, Clearstory windows, Pinnacles, water spouts, pointed arches, use of Baobab and Date Palm trees etc. is in agreement with some expert's opinion of denouncing the institutionalized appearance by making the facility looks residential or home-like. Therefore, designing familiar surroundings and including objects that can vividly replace an institutional feel to one's home experience is considered in rehabilitation center design.

The research concludes that, for the fact that drug de-addiction and rehabilitation now endeavors to provide

emotional support along with medical care, rather than aiming at removal of physical dependences on drugs only, the use of therapeutic spaces are therefore recommended for effective treatment and rehabilitation. It is also recommended that government adopts the use of therapeutic environment for treatment and rehabilitation of drug addicts instead of keeping them in Detention Camps and Prisons for an ineffective rehabilitation. This study if implemented by the government will restore the lost public confidence on the government and totally eliminate the illegally operating rehabilitation homes (owned, established and operated illegally by unlicensed individuals) in the country and become an important contribution that serves as a motivation to other researchers and government for creation of similar centers across the country in addition to gainful employment by our teaming youth.

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