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ARCHITECTURAL DESIGN CONSIDERATIONS TO ENHANCE SECURITY IN MIXED-USE BUILDING, LAGOS, NIGERIA

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In recent time, the concept of mixed-use development has been widely accepted as a sustainable strategy in urban planning as they provide efficient land usage and comfort for its occupants. One of the major problems associated with mixed-use building is security challenge as they contain several land-use with conflicting interest that has to be reconciled. This paper seeks to assess adequacy of design considerations for security in mixed-use building using Crime Prevention Strategies Through Environmental Design (CPTED). Fifteen mixed-use building were randomly selected from four local government areas in Lagos state. A descriptive survey method was adopted for the research and a structured observation schedule with selected variables focusing on CPTED principles was utilized. Data obtained were documented and analysed using Microsoft excel package. The study reveals that architectural design elements were not adequately used to deter offenders which make the building prone to attack. The study recommends that built-environment professionals adopt CPTED principles to enhance security. It also suggests adequate placement of bollard as an anti-intrusion system, the use of recreational play space to enhance natural surveillance, defining entrances for various functions in a mixed-use building to improve access control, and creating routine management plan to ensure image management.

Keywords: *Defensible Space, Design Consideration, Mixed-Use Building, Security, Sustainable Strategy.*

1. Introduction

In recent times, the concept of mixed-use development has been widely accepted as a sustainable strategy in urban planning and has been increasingly adopted in many cities (Hui et al; 2015), as they provide efficient land usage and at the same time provide comfort for its occupants (Anunobi et al.,2015). Mixed-use building is a well-structured building and with either the combination of shops, offices, residents, restaurant and other facilities (Niemira, 2007). It is a concept recommended contrary to zoning in urban planning since it created design challenges such as congestion, urban extension, pollution due to increase in greenhouse gas as a result of burning fuel for transportation from the residence to the workplace (Grant, 2002; Rowley, 1996). Greenhouse gas should be reduced as it may lead to global rising temperatures and climate change (Akande, 2015). Mixed-use building is now a vital means to address several urban design challenges (Garreau, 2011) and to achieve sustainability and smart development goals (Barnett, 2007).

One of the major problem associated with mixed-use building as highlighted by Niemira (2007), is security challenge since it contains multiple land-use with conflicting interest that has to be reconciled. This has led to fear of crime and security issues within the property. Also, crime statistic report from National Bureau of Statistics (NBS, 2017) reflected a high level of insecurity in Nigeria as 134,663 cases were reported in 2017. Offence against property has the highest number of cases stated with 68,579 cases reported. Lagos State which is the study area

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has the highest percentage share of total cases reported with 50,975 (37.9%) cases recorded. Offences reported include; 370 armed robberies, 77 wounding with menace, 12, 724 theft/stealing, 1,213 on burglary, 668 on house breaking, 417 store breaking offences, 5,623 on fake pretence and cheating/fraud, 403 offences on forgery, 233 offenses on stolen property, 764 on Unlawful possession of property, 222 reported offences on arson, 24,989 on offenses against property and 2,275 on other offenses (NBS, 2017).

However, building security now rely on active gadget for safety. These security gadgets may be hacked (Harris, 2013), or fail has they rely on electricity for their proper functioning and also due to their cyber nature. Hence the need to reduce over reliance on active security gadget, and ensure safety through physical security design element and considerations. This paper seeks to assess adequacy of architectural design element for security in mixed-use building. It adopts principles and strategies of Crime Prevention through Environmental Design (CPTD) for its assessment, as effective use of crime prevention strategies in the built environment can lead to a reduction in fear and occurrence of crime and also improve quality of life (Crowe, 2000). This study will help architects and planners to effectively utilize CPTED principles to reduce fear of crime and crime rate thereby creating a defensible space.

2.0 Development of Crime Prevention Though Environmental Design Concept

Crime Prevention Through Environmental Design (CPTED) is a concept that utilize architecture design strategies to reduce fear and occurrence of crime (Crowe, 2000). Cozen et. al (2015), reported that CPTED ideas are traced to Jacobs (1961), Jeffery (1971), and Newman (1972, 1973), among others. However, Newman's work on Defensible Space was acknowledged by Jeffery in 1976 as the basis of modern CPTED (Jeffery, 1976). This was based on the complexity of Jeffery's work while Newman's approach was much simpler and had the potential for instant application (Andresen, 2010).

Defensible Space as defined by Newman (1973) is a residential setting whose physical features function to allow users of a space to become key agents in ensuring their security (Cozens et. al, 2015). It is made up of four design elements, which includes: Natural surveillance, Territorial reinforcement, Natural Access control and image management. Presently, the application of Defensible Space has expanded beyond housing projects to include a variety of land uses and has been refined as CPTED core concept with many other concept (Cozens et. al ,2015). CPTED is now widely accepted by the United Nations and by governments all over the world (Cozens 2014).

2.1 Principles of CPTED

CPTED principles focuses on design elements that make legitimate users of a space feel safe and can discourage unlawful users from carrying out unlawful acts (Cozens et. al ,2015). CPTED can be proactively effected at the design stage as reported by Cozens (2014), and highlighted the seven CPTED principles as: territorial reinforcement, natural surveillance, image management, access control, legitimate activity support, target hardening and geographical juxtaposition.

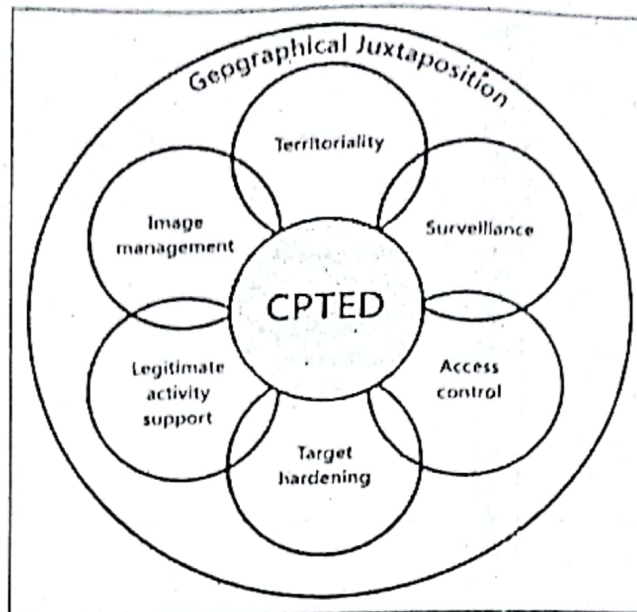


Figure 1: Principles of CPTED

Source: Adapted from Cozens (2014).

2.1.1 Natural surveillance

Natural surveillance utilises passive design opportunities for residents, neighbours, and bystanders to observe their environment, as it enhances physical protection (Painter and Tilley, 1999). It supports good visibility in and around the buildings to limit concealment of criminal activities. Natural surveillance can be informal which requires the use of window placement and sizes of openings, formal or organised using security patrols or checkpoints (Cozens et. al, 2015).

East Carolina University (ECU, 2011) suggested design strategies for natural surveillance which includes; ensuring visible, clear and defined lines of sight through windows and doors. Parking lots arrangement should be perpendicular to buildings to maximize visibility. Landscape elements should be design to support surveillance and access control. Use baffle type wall in restroom to support visual surveillance. Other design strategies involve construction without large blank walls on buildings as it hinders visibility. And creating design that prevents dead-end corridors, isolated stairwells, and open areas under stairs as they can be used as hideout by offenders (ECU, 2011).

2.1.2 Territorial reinforcement

Territoriality is a concept that clearly delineates boundaries and helps to create a sense of ownership. It reduces level of fear of crime and crime when adequately utilized (Brown, 2001; Ratcliffe, 2003). It can be achieved by using physical elements such as fences or real barriers, pavement treatment, art, symbolic barriers, and good landscaping. ECU (2011) recommended design consideration for territoriality which include; provision of a defined boundary around the building, selection of walkways design, vegetation, and site features to delineate spaces. The use of signage to reinforce territoriality and to support way finding and adopting symbolic barriers to define a public space from private space.

2.1.3 Natural access control

Natural access control focus on reducing prospects for crime by denying entry to potential targets and forming a heightened view of risk in offenders (Cozens et. al, 2005). Access control can also be formal or organised access control (e.g. security personnel) and mechanical access

control (e.g. locks and bolts). Natural access control relies on doors, fences, shrubs, and other physical elements to keep unauthorised persons out of a particular place. Security design criteria that can be used for access control include; adoption of site features, building design, and pathways to direct pedestrians and vehicles into intended pathways. And restricting the number of entrances into a building without inhibiting its functionality (ECU, 2011).

2.1.4 Image management

Image management seeks to promote a positive image and routine maintenance of the built environment which transmits positive signals to all users. Based on Newman (1973) principle, poorly maintained urban space can attract crime and deter use by legitimate users. For example, vacant properties have been seen as crime “magnets” providing prospects for deviant and criminal offenses (Cozens et. al, 2015).

2.1.5 Target hardening

Target hardening reduces the risk associated with crime while increasing the effort and risk of offending. There is, however, much disagreement concerning whether or not target hardening should be considered as a component of CPTED (Cozens et. al, 2015). It focuses on denying access to a crime target through the use of physical barriers such as fences, gates, security doors, and locks.

2.1.6 Active support

Legitimate activity support uses design and signage to encourage acceptable behaviour in the usage of space. Cozens et. al (2015), described safe activities as an attractor for legitimate users who may then act to prevent offending. This technique has perfect links with territoriality, access control, and surveillance. Increasing the numbers of pedestrians may offer additional “eyes on the street” and possibly prevent some offenses.

2.1.7 Geographical juxtaposition

Newman (1973) referred to the impact of geographical juxtaposition with ‘safe zones’ and how ‘safe’ or ‘unsafe’ activity affects a residential environment or any area. Cozens (2014), argued that geographical juxtaposition is a forgotten principle of CPTED. Evidence indicates certain land uses and environmental settings can exhibit increased levels of crime linked to their mundane activities and can influence crime rates in nearby locations (Eck et al, 2007).

3.0 Methodology

The study adopts a descriptive survey research approach. A structured observation schedule was prepared to obtain relevant data for the study from fifteen (15) mixed-use building which are randomly selected from four local governments in Lagos state. The paper aimed at providing information on the level of availability of passive design element or considerations on mixed-use building in Lagos, with a view to proffer design solutions to enhance security in mixed-use building. The variables adopted for the study assessment are the four core CPTED principles based on defensible space (Newman, 1973; Cozens 2014). The core principle utilized are territorial reinforcement, natural surveillance, natural access control and image management.

Design elements observed in the collection of data under territorial reinforcement include; nature and type of gate, bollard, vegetation, retaining wall, boulders, and fence. The following element were also observed under natural surveillance; openings which allows for surveillance such as arch ways, windows, landscape element such as site furniture, and security light. Also nature of gates, doors, security checkpoints and signage were elements observed under natural access control. More-also well maintained landscape, well maintained built structure, presence

of litters/rubbish, evidence of vandalism/ graffiti and evidence of boarded up windows were closely assessed to measure image management which is also determines crime rate or fear of crime.

4.0 Discussion of result

The study adopted four key variable of crime prevention strategies through environmental design (CPTED) for its assessment. The data gathered was documented and analyzed using Microsoft Excel Package and the result was further developed into tables before it was graphically represented in charts as shown in the paper. A Spoint Likert scale with the scale ranging from 0 - 4 were used as shown below;

0 - Non availability; 1- Inadequate; 2 - Fair; 3 - Adequate; 4 -Very Adequate.

The result is discussed under the four key variables of CPTED which forms the basis of the study assessment.

4.1 Territorial reinforcement

Most of the mixed-use building selected for observation adopt wall fence as a means of passive barrier which are adequate for security. Only few uses gate, vegetation, bollard for territorial reinforcement. While none uses retaining wall, water bodies and boulders to secure their territory.

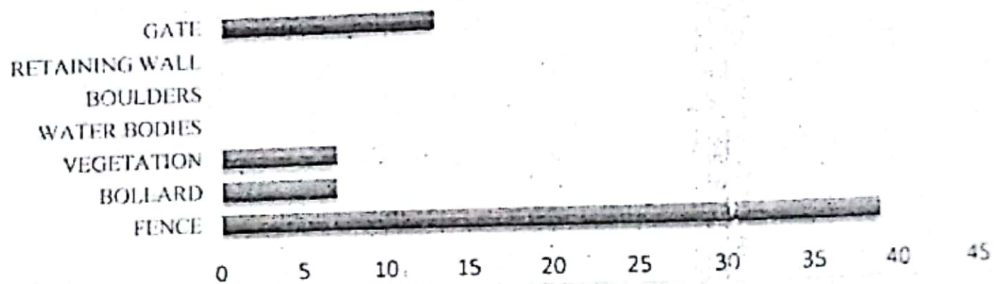


Figure 2: territorial reinforcement used at the selected sample



Figure 3: Use of bollard at Adesco Otuyo Plaza and the use of security post at Toscanini Plaza

4.2 Natural surveillance

Building openings such as arc-ways, and windows are adopted as a means of natural surveillance with security light and walkways. These passive elements are adequately used to observe the environment to ensure defensible space. None of the facilities studied utilizes street furniture which is very adequate for user to observe their environment.

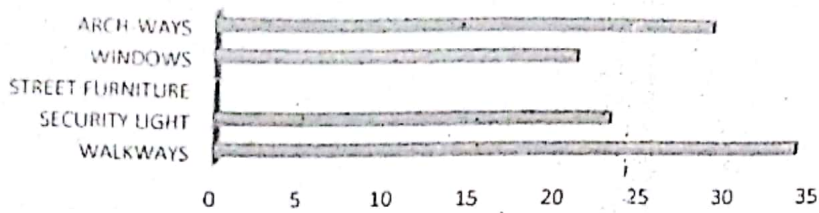


Figure 3: Natural surveillance element used at the selected sample

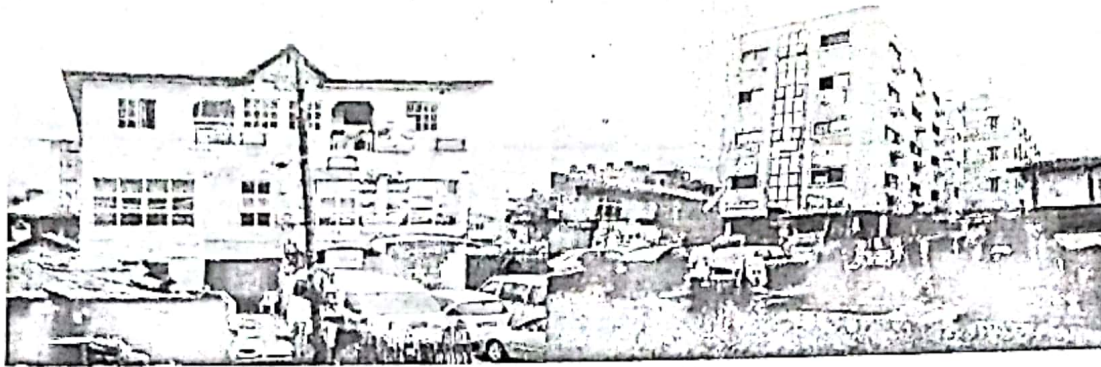


Plate 2: The use of windows and arc openings for natural surveillance at Princess Munirat Apena Plaza and Oliss Plaza Ikeja

4.3 Natural access control

Doors were very adequately used as a means of access control in the selected facilities. Gate, signage, and walkways were also adequately utilised while bollard and security check point are inadequately utilised in the selected mixed-use building.

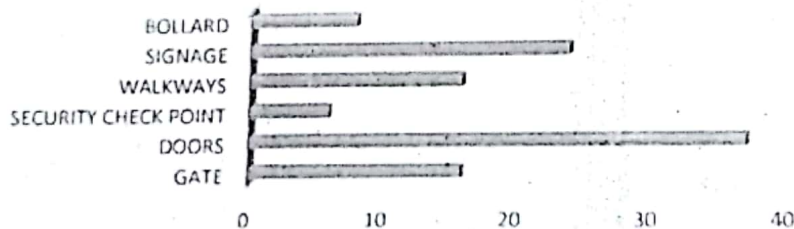


Figure 4: Natural access control element used at the selected sample



Plate 3: The use of doors and bollard for natural access control at Omonua Plaza, Tomade Street, Ikeja and Fero Plaza Mushin, Lagos.

4.4 Image management

The study reveals that the facilities accessed focused more on maintenance of the building structure than its surrounding landscape. Evidence of litters/rubbish within their facilities were reduced and while evidence of vandalism and boarded-up windows were spotted in few facilities. This was due to poorly-maintained environments which exhibits evidence of incivilities, including graffiti and some vandalism

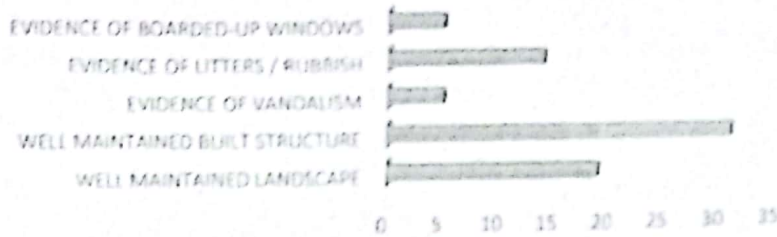


Figure 5: Level of image management within the facilities selected



Plate 4: Poor level of image management at Munirat Apena Plaza Ikeja and Ikebudu Plaza Agege, Lagos.

5.0 Discussion of Findings

The result shows that most of the facilities assessed adopt physical security element or barriers for defining territory only or to create a sense of ownership. 28% of the selected sample focus on territorial reinforcement, 23% utilizes means of natural surveillance, 23% also adopted passive element for access control while 26% focused on image management to deter offenders. Most of the element used for territorial reinforcement are adopted for aesthetic purpose rather than security functions. Some facilities lack anti-intrusion device such as gate and bollard to prevent an intruder from entering the site. Those facilities that utilise bollard could not maintain adequate spacing to deter unwanted cars from gaining access to site. However, windows and arch-ways are adequately used in most facility for natural surveillance while few utilises security post or checkpoint for formal surveillance to reduce fear of crime. Also, the access to most site is not restricted with gate and bollard. Fence is only adopted to secure the rear and side views of the site while the front is exposed to security threat.

6.0 Conclusion and Recommendation

This study has shown that most mixed-use buildings have security design challenges and revealed the level of security offered at the selected facilities. The security considerations adopted at facilities studied are inadequate to deter offenders which makes them prone to attack. This is due to the inadequate placement of anti-intrusion barrier system. Security barriers are only adopted to create a sense of ownership and to delineate property boundaries. The research support CPTED audit by Cozens et al (2016) and shows safety concerns among users and residents.

This study recommends that architects and urban planners adopt recreational play space using site furniture within the building territory to enhance natural surveillance. This will enhance observation of the property by its user. Also, landscape element such as trees, shrubs and hedges, should be planted to direct movement and also to improve image management. Effort should be made to ensure static bollard are placed with the standard spacing of 1.5 meters maximum to improve access control on site. Security light should be provided at strategic point to enhance natural surveillance. Defining entrance for various land-use to ensure access control. Adopting signage to control movement within the site and creating a routine management plan to ensure image management.

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