EFFECTIVENESS OF PASSIVE DESIGN FEATURES AND ACTIVE INSTALLATIONS FOR SECURITY IN LARGE SHOPPING CENTRES IN ABUJA, NIGERIA

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Abstract
Nigerians have been witnessing a class struggle among developers and investors competing for who builds the largest shopping centres. However, some of these shopping centres are being abused by a few patronisers who hide under the guise of shopping to engage in some indecent and criminal activities. The shopping centre business concept has not only boosted the country's gross domestic product (GDP) and created jobs but has provided recreation and relaxation centres for those who have the financial capacity to patronize them. A major challenge is that the building design and security planning phases of most of these shopping centres seem to be running independently of each other, as opposed to working together to achieve a fully secured building. This paper examines the effects of passive design features on active security installation in large shopping centres. To achieve the desired objectives, data obtained through primary and secondary sources comprised the use of structured observation schedules and questionnaires. A total of 240 questionnaires were distributed to security personnel in 30 selected shopping centres using a stratified sampling method. Descriptive statistics was used to analyse the data obtained. The results showed the level of effectiveness of the existing passive design features in the installation of security elements. It is recommended that the design of shopping centres bearing cognizance of passive design should extend to the provision of maximum security

INTRODUCTION

Prior to the twentieth century, the only way to control indoor conditions was through passive means. The hot-dry climate poses environmental challenges of high temperature and this extreme temperature must be catered for at the design stage to avoid absolute dependence on active energy systems for comfort within buildings (Akande, 2010). Passive design refers to the design of a building and the space within it to benefit from natural light, ventilation and even temperatures (Boake, 2011). It responds to site conditions and local climate to maximize building users' comfort, health and safety by minimizing energy use (Jaques, 2008). The building form and thermal performance of building elements (including architectural, structural, envelope and passive mechanical) are carefully thought out and optimized for interaction with the local microclimate (Napier, 2015). The ultimate vision of passive design is to fully eliminate requirements for active mechanical systems (and associated fossil fuel-based energy consumption) and to maintain occupant comfort always.

There is no doubt that the "large shopping centre" culture has caught up with Nigerians, especially those resident in the cities and urban areas (Borg & Nurse, 2015). For more than a decade now, there has been a class struggle among developers and investors competing for who builds the biggest shopping centres (Ezea, 2017). The new business concept has not only boosted the country's gross domestic product (GDP) but it has also created jobs and provided business and relaxation centres for those who have the financial capacity to patronize them.

Large shopping centres in Nigeria are places where people not only come to shop, but also to hang out, engage in window or mystery shopping and savour the chilling ambience (Ezea, 2017). The large shopping centre culture has in some way broken the status barrier that used to be so obvious in the country as most middle-class people can now go into shopping centres and feel a sense of belonging. However, some of these shopping centres are now being abused by some patronisers who hide under the guise of shopping to engage in some indecent and criminal activities (Fennelly, 2012). Prominent among these are unsuspecting hoodlums who disguise as customers, sometimes dressed corporately and positioned in strategic places within these centres.

Security in buildings comprises three key objectives: to detect the presence of threat, to deter its occurrence, and to respond accordingly (Kovacich et al, 2012). Electronic surveillance, in its current conception and use, meets primarily the first two objectives. Active security measures include visual assessment of an alarm or event, area surveillance and monitoring, and deterrence. Response, which is the ability to respond to or intervene in a threat, has room for further development. Many times, security is tied to negative connotations and notions like threats, crime, fear, control, loss of privacy, discrimination, inequality, and insensitivity (Pearson, 2011). Such perceptions overpower security's positive energies that are linked to its definition as "freedom" as well as the goals of security schemes to reduce fear and improve quality of life (Manaugh, 2016). Designs that do not consider active security must rely on extensive and costly security systems to maintain adequate surveillance, which may or may not even be comfortable (Fennelly, 2012). Furthermore, even the most efficient technologies will use more energy than is necessary with a poorly designed building (Caldas, 2008). Hence, this research assesses the level of effectiveness of passive design and active security features as a means to connect people to people safely and people to the environment.

OVERVIEW OF SHOPPING CENTRES
A shopping centre is a product of the real estate industry, created by intentionally aligning the location, customer mix and tenant mix (Reikli, 2012). Shopping centres originally stemmed from old covered market places that were common between the 10th and 15th centuries, and are even still functional today in many parts of Nigeria. Through the 1950s, large indoor shopping malls began to spring up in major cities across the world, with the first ones springing up in the United States and other famous ones being built in Paris and London. The period between the 1980s and 2008 saw large shopping centres begin to give room for factory outlet centres (where manufacturers could sell their own products at discounted prices. (Haynes and Tilpade, 1996; Kang and Kim, 1999). Shopping centres began to incorporate entertainment in different forms such as live music, cinemas, food courts, robotic animal displays and other interactive merchandising techniques. It was in this period that shopping centres began to spring up in large numbers in Africa, the idea fast selling among the middle and high class in the big cities (Diyan, 2015). The current largest shopping centre in Africa is the Mall of Africa in South Africa, which opened in April 2016 with 131,000 square meters of retail space. Currently, a good number of shopping centres in Nigeria serve as popular hangouts and meeting points for people of various calibres, especially during weekends and holidays. The Federal Capital Territory has the advantage of being well-planned over many other cities in the country. As a result, all manner of residents have various needs that seek to be met. Common to see are foreign names like Shoprite, Park and Shop, Game and Cold Stone which have taken advantage of the high demand for retail space that is fuelled by the growing populace with considerable buying power.

SECURITY IN SHOPPING CENTRES
Historically, the notions of security and surveillance have been closely linked with natural surveillance (which is the ability to see what is happening) as a means of achieving security. Relying heavily on the physical dimension, both security and surveillance fell within the domain of architects. Security refers to a state of calmness or the condition that is tied to the lack of feelings experienced by those who are afraid or threatened. Its reference to freedom further defines the term's universal character, aligning security within basic human rights and needs (Caldas, 2008). Offenders will most times make best use of crime opportunities, and therefore, those chances must be avoided (in the first place) or removed (following the advent of a crime problem) (Armitage, 2014). Security actions that are intended to deny unauthorized access to buildings, equipment and properties, and to protect personnel and property from damage or harm (such as unwarranted spying, theft, or terrorist attacks) are more commonly referred to as physical security (Fennelly, 2012). This makes use of systems like CCTV surveillance, security guards, protective barriers, locks, access control protocols, and many other techniques which are inter-reliant on each other for effective security to be accomplished.

PASSIVE DESIGN FEATURES FOR ACTIVE SECURITY INSTALLATION
Passive design features for active security installation specifically refer to design essentials that can be merged with security features to maximize comfort and security and the needed privacy with little or no increase in energy consumption (Jaques, 2008). These features can be categorised into four main elements, namely deterrence, intrusion detection and electronic surveillance, access control and security personnel. The aim of deterrence is to sway potential attackers into thinking that a successful attack is unlikely by reason of strong defences (Manaugh, 2016). Examples in physical space include tall fences topped with barbed wires, restricted access points, vehicle height-restrictors and security

lighting. These help to delay, make difficult or totally prevent intrusion. Intrusion detectors comprise of alarm systems and sensors and video surveillance systems (Atlas, 2008). Alarm systems work hand in hand with physical barriers and security guards to activate response when the other forms of security have been breached. Surveillance cameras are useful for incident authentication and a historical breakdown. Access control methods are used to observe and control traffic through specific access points and areas of the building (Pearson, 2011). They comprise of turnstiles, security doors and gates. Security personnel perform many functions: as patrols and at checkpoints, to administer electronic access control, to respond to alarms, and to monitor and examine videos.

RESEARCH METHOD
Data for the study was obtained using an observation schedule purposefully structured to provide sufficient and relevant information for the analysis of the study, which involved assessing the level of effectiveness of passive design features and active security installation within large shopping centres in Abuja, with a view to proffer design solutions that will enhance security. The study sample was selected from Abuja Municipal Area Council using the stratified random sampling method because Abuja has many shopping centres. In totality, thirty shopping centres were selected based on the following criteria that define a large shopping centre in Nigeria:
1.   One or more buildings forming a complex of shops
2.   Interconnecting walkways
3.   Presence of anchor stores
4.   Serving an estimated primary area of 4.8-9.7km
5.   A strip configuration, or L- or U-shaped configuration
        The elements observed include the type of gates (pedestrian and vehicular), fences, entrance doors, window styles and materials, access control type, style of staircase, location of video surveillance system, buffer spaces, landscape consideration, space planning and lighting adequacy. A questionnaire was also administered to security personnel who were placed in charge of surveillance within the selected shopping centres. They were required to rate selected variables that related to the effectiveness of passive design features in active security installation within the shopping centres. Although 240 questionnaires were prepared, a total of 221 security personnel participated in the study and their opinions were collated using a Likert scale. The data obtained was gathered, sorted and analysed using SPSS while the results are represented in form of tables, charts and plates to further buttress explanations within the result discussion.

DISCUSSION OF RESULTS
Among the 240 questionnaires distributed, 18 were unanswered, leaving a total of 221 valid questionnaires. Three categories of Likert scales were used to divulge the opinion of security personnel regarding the concerned shopping centres in Abuja.

Frequency of Crimes Experienced at the Shopping Centre and Its Environs
Figure 1 shows the frequency of crimes experienced in large shopping centres in Abuja, expressed as a percentage of crimes generally common to shopping centres of this magnitude around the world. From the questionnaires administered to security personnel, theft was found to be the most common crime among shopping centres, followed closely by retail shrinkage. It can be observed from Figure 1 that theft is the crime that occurs the most, among all other crimes. Other crimes like kidnapping and murder do not have records of occurrence in the selected large shopping centres.
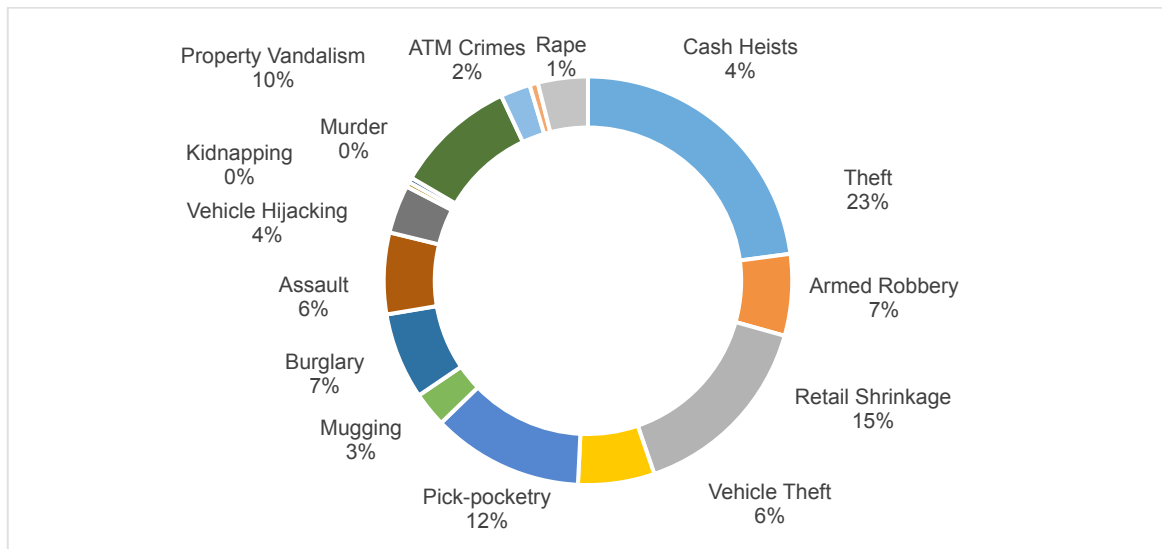
Figure 1: The Frequency of Crime Experienced Within Shopping Centres in Abuja

The range of values for each option of crime frequency is as follows:

Never	1.0-1.49
0-3 months	1.5-2.49
4-6 months	2.5-3.49
7-9 months	3.5-4.49
Over 9 months	>4.5

Table 1.0 shows that theft and retail shrinkage are the most frequent crimes that occur in large shopping centres, occurring as frequently as 4-6 months. Other crimes like pick-pocket, property vandalism, burglary, armed robbery, vehicle theft and assault may have occurred at some point, but not as frequently as the last two crimes on the table.

Table 1.0 Respondents opinion on frequently occurring crimes

	Measured Variable	Number of Respondents	Sum	Mean	Interpretation
1	Kidnapping	221	230	1.04	Never
2	Murder	220	231	1.05	Never
3	Rape	218	238	1.08	Never
4	ATM Crimes	221	279	1.26	Never
5	Mugging	220	284	1.3	Never
6	Cash Heists	219	293	1.32	Never
7	Vehicle Hijacking	220	315	1.43	Never
8	Assault	220	341	1.55	0-3 months
9	Vehicle Theft	220	377	1.7	0-3 months
10	Armed Robbery	221	394	1.79	0-3 months
11	Burglary	221	402	1.83	0-3 months
12	Property Vandalism	221	454	2.05	0-3 months
13	Pick-pocketry	221	478	2.17	0-3 months
14	Retail Shrinkage	221	553	2.54	4-6 months
15	Theft	221	653	2.95	4-6 months

Level of Risk of Shopping Centre Assets
Table 2.0 shows the spread of the respondents with regard to the frequency of risk faced by shopping centre assets. It can be deduced that the riskiest assets in most shopping centres are the merchandise. This directly translates to theft, which is the most common crime confronted by Abuja shopping centres.

A 4-point scale ranging from "Very High Risk" to "Very Low Risk" was used. The range of values for each option of crime frequency is as follows:

Very High Risk	1.0-1.49
High Risk	1.5-2.49
Low Risk	2.5-3.49
Very Low Risk	3.5-4.49

A list of crimes is shown against the respondents' opinion on the shopping centre assets that stand the most risk. Based on the opinion of 221 respondents on average, cash is the asset faces the highest risk in a large shopping centre. Table 2.0 displays the shopping centre assets in a ranked order of risk from highest to lowest. It can be deduced that cash, safes, vehicles in the parking lot and merchandise face a high risk of being stolen or tackled by intruders. Among these four, cash faces the highest risk in the opinion of the respondents, followed by the safes/vaults where the cash is being kept. Assets that face the lowest risk are the human assets- security personnel, the management, customers and employees. This is because it takes a high level of planning to carry out attacks on human beings within a public space and as indicated, petty thieves are the most common criminals to watch out for in a large shopping centre.

Table 2.0 Respondents opinion on the Level of Risk of Shopping Centre Assets

	Measured Variable	Number of Respondents	Sum	Mean	Interpretation
1	Cash	221	390	1.76	High Risk
2	Safe/Vault	221	466	2.11	High Risk
3	Vehicles in Car Park	221	471	2.14	High Risk
4	Merchandise	221	496	2.24	High Risk
5	Security Measures on Site	221	628	2.85	Low Risk
6	Management	221	640	2.9	Low Risk
7	Customers	220	644	2.91	Low Risk
8	Employees	220	652	2.95	Low Risk

Plate 1.0 displays vehicles parked in a large shopping centre. It is common in the Federal Capital Territory to come across signs that warn vehicle owners of parking at their own risk. This means the shopping centre authorities or security personnel will not be held accountable if the vehicle gets damaged or stolen, or any item saved inside goes missing (Chowdury, 2007). This is the main reason why vehicles face high risk in large shopping centres. It was discovered that some shopping centres go further to dish out parking tickets and demand payment for vehicular parking, but shred off all responsibility in the occurrence of a damaged or missing vehicle. However, some shopping centres were found to have adequately fitted their parking lots with video surveillance systems and a number of security personnel patrolling the lots at different times, thus seemingly providing security to the best of their capability

Plate 1.0: Vehicular parking at Jabi Lake Mall

Effectiveness of Response of Security Features within the Shopping Centres
In Table 3.0, a 4-point scale was also employed to rank the level of effectiveness of response by the shopping centre staff. It ranged from "HE" to "HI". The table shows the spread of the respondents with regard to the effectiveness of response by staff in Abuja shopping centres.
The range of value for each option of crime frequency is as follows:
Highly Effective (HE)   1.0-1.49
Effective (E)   1.5-2.49
Ineffective (I)   2.5-3.49
Highly Ineffective (HI)   3.5-4.49.
        Table 3.0 shows the level of effectiveness of the passive design features that were observed in actively curtailing crime and aiding security in shopping centres. The most effective passive design feature noted in the selected shopping centres was the location of the restroom entrances in each

building. It was observed that all the shopping centres located the restrooms in one or more of the following:
1.   A separated, smaller building allocated to serve as convenience for the shopping centres.
2.   Corners that boldly indicated "restroom" yet gave privacy to users of both genders.
3.   Spaces that were properly lit and gave no room for unnecessary loitering.
        Other features observed were likewise ranked as averagely effective, with security around entrances and exits and prompt response to customers' call for help topping the list. This indicates that security personnel employed play a vital role in overseeing the proper use of all the passive design features put in place to provide active security in a large shopping centre.

Table 3.0 Respondents opinion on the level of effectiveness of the security features within designed spaces in shopping centres in Abuja

Measured Variable	Number of Respondents	Sum	Mean	Interpretation
1 Location of restroom entrances	220	289	1.31	Highly Effective
2 Security around entrances/exits	221	418	1.89	Effective
3 Prompt response to customers' call for help	221	422	1.92	Effective
4 Location of parking lot	221	447	2.04	Effective
5 Care for the CAR PARK and PUBLIC TRANSIT stop areas	221	461	2.09	Effective
6 Lighting distribution	221	467	2.11	Effective
7 Visibility around car park	221	470	2.14	Effective
8 Movement along stairs and ramps	220	474	2.14	Effective
9 Outdoor security lighting	221	477	2.16	Effective
10 Surveillance around payment counter	220	491	2.23	Effective
11 Car park, stairway and elevator lighting	219	502	2.27	Effective
12 Surveillance around loading dock area	221	506	2.29	Effective

        Plates 2.0 and 3.0 show some of the security features installed in large shopping centres. Plate 2.0 displays a box camera installed directly at the entrance to the staff locker-room. The shopping centre management took extra measures to place the staff under surveillance in order to keep them accountable for certain items. In addition to the camera installed, security guards and a machine interface were placed to mark the entrance and exit of staff. These steps taken directly speak to the mind-set of staff and discourage any impolite behaviour.

Plate 2.0: Staff checkpoint at the staff locker-room in Grand Square Mall, Abuja

        Plate 3.0 indicates the incorporation of screen mirrors and doors as design features that provide a means of surveillance. The screens strategically face the payment counters and to the oblivious shopper, they look like the regular aesthetic doors and screens but they actually allow for monitoring of the shopping centre activities unbeknownst to shoppers. This passive design feature proved effective in installing the level of security desired behind the screened elements.

Plate 3.0: Security screen mirrors and doors at Apo Shopping Mall, Abuja

Overview of the Level of Effectiveness of Passive Design Features and Active Installations for Security in Shopping Centres in Abuja.

It was observed that the selected shopping centres attempted in different ways to provide security to the most valued assets (like cash and vaults) and the building itself. Open staircase styles, warning signs, enhanced lighting and sensors were used in most of the centres and while these were found to be helpful, the attitude of most of the security personnel seemed laid-back, as they mostly perceived security threats in terms of crimes like terrorist attacks, murder and kidnapping and thus paid little attention to threats in the form of intrusion, loss of privacy and crowds.

In Figure 2, 53% of the crime types assessed occur frequently, while 47% seldom or relatively never occurred. This indicates that the rate of occurrence of petty crimes is on the increase. It spreads beyond the protection of doors and windows and deals with the quality of one vendor's products as opposed to another of a reduced quality. It goes further to tell the social behaviour of a shopping centre.
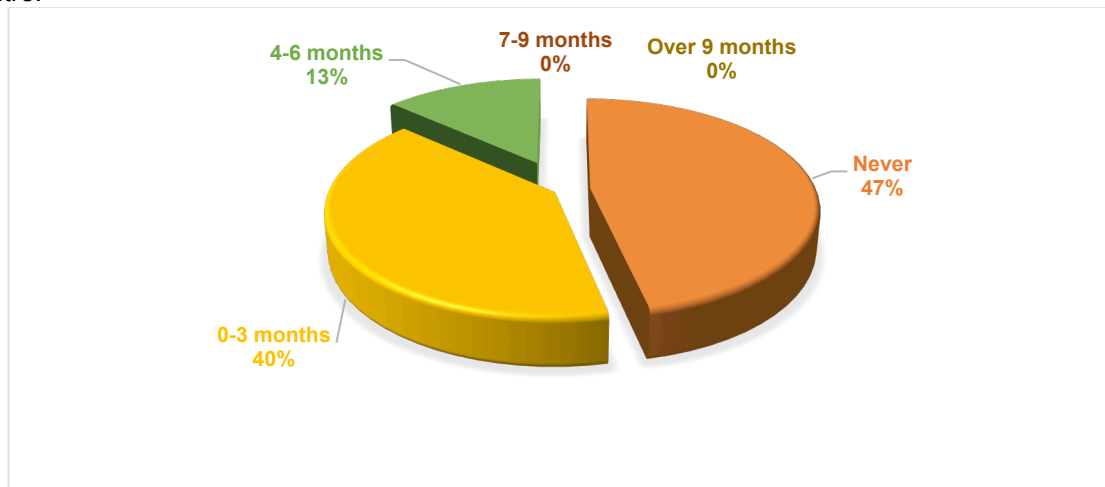

Figure 2: Frequently Occurring Crimes in Large Shopping Centres in Abuja, Nigeria

The level of risk of shopping centre assets is represented graphically in Figure 3, indicating that the higher the mean value of each asset, the lower the risk of threat faced by the tagged asset. Thus, a greater number of the security personnel opined that cash was the asset at the foremost risk in a shopping centre.

92% of the security personnel were of the opinion that the available design features in the respective shopping centres were positioned to give the right support to the security measures or installations available, hence the high level of effectiveness as represented in Figure 4.
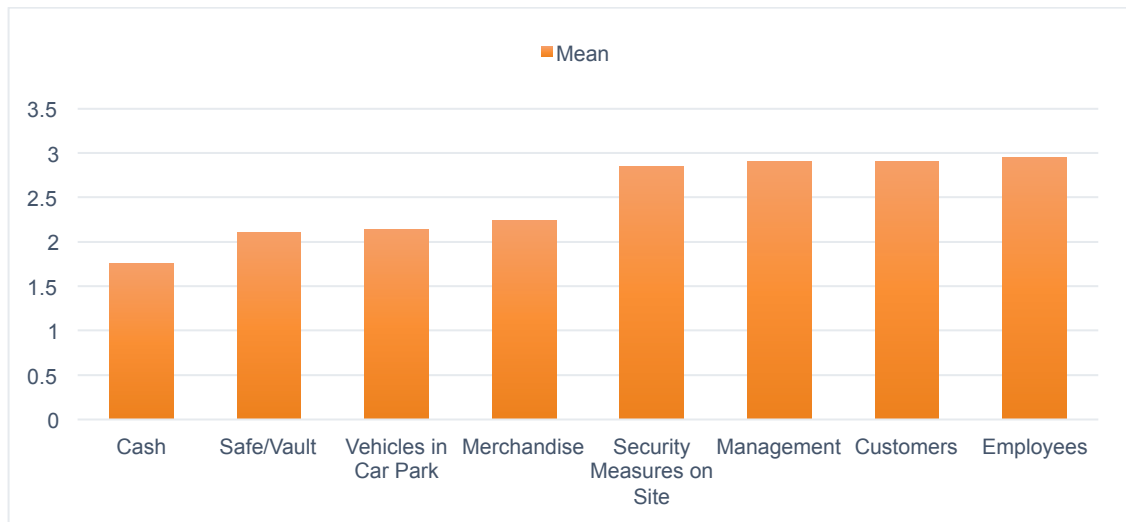
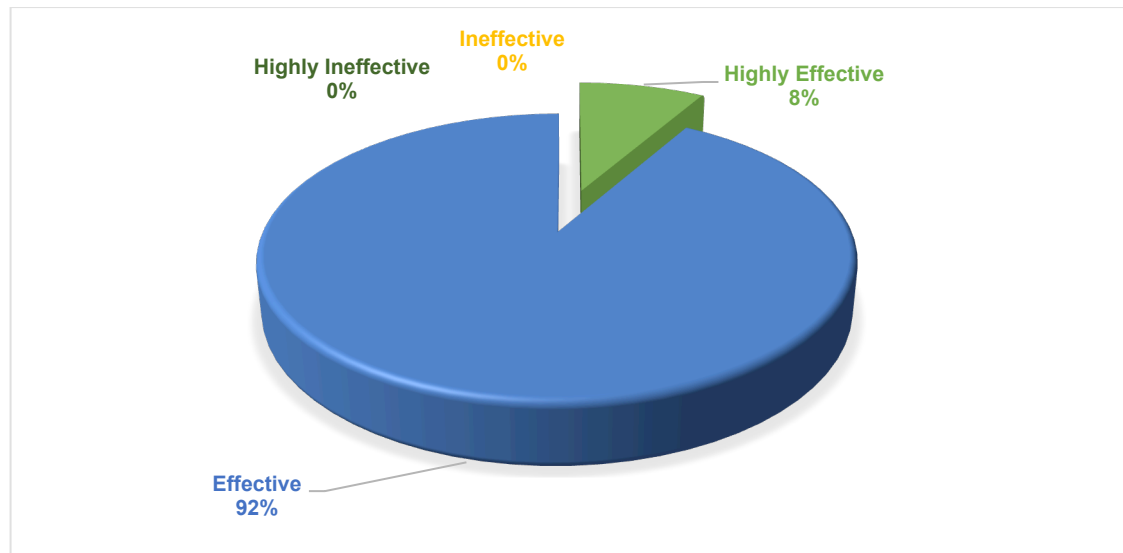Figure 3: The Level of Risk of Shopping Centre Assets

Figure 4: The Level of Effectiveness of Response Within Shopping Centres in Abuja

CONCLUSIONS

The response drawn from security personnel regarding various crime types and targets points towards theft. Petty theft and shoplifting are the main security challenges faced by large shopping centres in Abuja. Although the goods stolen commonly have little value, the act of stealing itself bears negative impact on business persons scouting to set up shops in big buildings for fear of the safety of their goods. It is common to find video surveillance systems and uniformed security personnel in almost every large shopping centre in Abuja. However, occurrence of petty crimes is still reported on a frequent basis. This means that the intruders or criminals have observed and found a way to boycott these security installations put in place to prevent or oversee crime in the first instance. Thus, there is the need to strategically fit in security installations that will not be obvious to unsuspecting shoppers, but trigger a response by security specialists to discriminate activities carried out within or around large shopping centres.

RECOMMENDATIONS

In refining the level of effectiveness of passive design features and active installations for security, the following measures should be deliberated upon:

1.   Structural elements such as wall partitions and columns that potentially create dark areas and blind spots should have suitable cameras latched onto them.

2.   Video surveillance and alarm systems should be effectively embedded in commercial buildings, with round-the-clock supervision by employed security personnel, landscape and lighting elements to avoid rousing the attention of unsuspecting intruders.

3.   Clothes racks and display shelves should be arranged in a way that does not obstruct observation from employees but directs the movement pattern of shoppers.

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