COST COMPARISON BETWEEN BUILT-IN SECURITY COMPONENTS AND SOME PHYSICAL CHARACTERISTICS OF BUILDINGS IN NIGERIA: Case Studies of Residential, Commercial and Institutional Buildings in Abuja and Minna

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ABSTRACT

This paper examines the impact of physical characteristics of buildings on the costs of providing security in building projects. The study achieved this by establishing the existence or otherwise of significant differences between total costs of security components in buildings and (i) the nature of the use of the buildings, (ii) the number of floors in the buildings and (iii) the location of the buildings. The paper employs a survey approach, by utilizing a data collection proforma to capture eighteen (18) different variables spread over various elements in building and security components. The results showed that the total costs of built-in security differed significantly amongst the various uses of the building and buildings located in Abuja, as compared to those located in Minna. (P0.05 = 0.041; 0.022); buildings located in Abuja had a relatively lower value (323.91 compared to 964.57 for buildings located in Minna). The study concluded that, the commercial buildings included in the study samples were mainly simple market stall/warehouse buildings that had few openings, and thus lower costs of securing the buildings. The paper recommended that appropriate designs that incorporate built-in security components should always be the focus/priority of the building owners.

Keywords: Building Cost, Crime Prevention, Built-In Security Components, Housing.

Introduction

No nation, not even the highly developed ones, is crime free. Crime occurs in various forms: cheating, stealing, in various degrees *viz*; pick-pocketing, armed robbery, advance fee fraud, embezzlement and drug-peddling. Crime takes place at different locations: at offices, homes, recreational centers, and in transit. The historical background of housing developments cannot be divorced from criminal activities committed within houses, usually following forceful entry by the perpetrators. Such crimes include burglary, breaking and entering, and armed robbery, as reported by Gashash (1996) and Ikoro (1997). According to Anthony and Paul (1992), the developments of houses for human residence, commercial and other types of buildings have responded to the need to fortify them to forestall the commitment of crimes.

The increasing importance of infrastructure security against the backdrop of well documented threats such as vandalism, fire outbreaks, armed robbery, burglary and terrorism contrasts sharply with the reality that empirical relationship and comparison between infrastructure facility characteristics and costs implications of security concerns are non-existent. This paper is focused on deriving and explaining such relationship in the case of buildings devoted to residential, commercial and institutional uses. Anifowose and Oke (2008) established that the security concerns of private individuals are expressed through the provision of built-in security components in their houses. Such components are intended to fortify the buildings against external attacks by criminals, and include the provision of burglar proofing, perimeter fencing, guard huts and external floodlighting. Other security devices such as anti-burglar alarms are usually not within the financial reach of the majority of low and medium income owners of houses. Anifowose (2003; 2007) have tried to establish the proportions of total building costs that are devoted to security-related components in buildings. Such works have been based on an arbitrarily selected residential building type which limits its applicability to buildings devoted to other uses. However, the aim of this study is to examine the impact of physical characteristics of buildings on the costs of providing security in building projects. The study intends to

achieve this by meeting the following objectives; Establishing the existence or otherwise of significant differences between total costs of security components in buildings and (i) the nature of the use of the buildings, (ii) the number of floors in the buildings and (iii) the location of the buildings.

This study is based on the following null hypotheses that no significant linear relationship exists between the following pairs of variables:-

H_{o1}: There is no significant difference between the total costs of security components of the sampled buildings with respect to the function.

H_{o2}: There is no significant difference between the total costs of security components of the sampled buildings with respect to the number of floors.

H_{o3}: There is no significant difference between the total costs of security components of the sampled buildings with respect to the location of the buildings.

The scope of this paper is however limited to those components that are included in building for their security characteristics, and are built in as the building work progresses. Security systems external to the building, not forming an integral part of it, such as guard patrols are not covered by this paper.

The data utilized by this paper was sourced from buildings of a residential, commercial and institutional building nature constructed within the study area, which covers the federal capital of Nigeria, Abuja, as well as the capital city of Niger State, Minna. Minna is located about 200 kilometres north-west of Abuja (see Map 1). The monetary values of security components employed by the study refer to projects proposed and executed between 2005 and 2007, and are expressed in Naira. The average official rate of exchange over this period of time was about 120 Naira to 1 US Dollar.

Related Works

According to Faruqee (1994), Crimes and criminal activities escalated in Nigeria following the Nigerian civil war {1967-1970}. This escalation became a national embarrassment in the year following the collapse of the Nigerian economy {1980-1981}.The harsh effects of the various prescriptions for recovery also fuelled this escalation. New forms of criminal activities gained prominence in structural adjustment programme (SAP) and post structural adjustment programme (SAP) years {1985 – date}. Thus, armed robbery, drug trafficking and advance fee fraud {419} became celebrated crimes. Drastic measures to curb the expansion of criminal activities such as the application of the death penalty do not have the desired effect. Property security is an important research topic; security in this respect covers the incidence rate of fire in residential buildings, which in Saudi Arabia accounts for 69% of all building fires. Al-Homoud and Khan (2004) carried out a field assessment of current safety issues for residential buildings in Saudi Arabia to identify common safety deficiencies. The survey showed that most residents were ignorant of many safety aspects in their homes. Abrahamsen and Williams (2006) postulated that Security Sector Reform (SSR) has become a central part of development policy, given an increasing recognition of the links between security and development. They observed however that following a traditional weberian conception of the state, such reform programmes are almost exclusively focused on the public security sector, neglecting the extent to which people in developing countries have come to rely on private security providers for their day-to-day security needs.

Theoretical writings on security have tended to explore the increasing connections between capital and security. Neocleous (2007) did so by first exploring the rise of the security industry in the context of the current 'war on terror', before linking this to the rise of a parallel industry in policing and incarceration. These three dimensions of the security industry have tended to be understood through the notion of privatization and instead of taking this route; Neocleous (2007) tries to understand the security industry through the

concepts of commodification and fetishism. A further feature of recent writings on security is the idea of a convergence of internal and external security (no doubt influenced by the notion of the world as a global village). Lutterbeck (2005) considers that in post-Cold War-era Western Europe the dividing line between internal and external security has become increasingly obsolete. This convergence of internal and external security agendas point to a militarisation and externalisation of policing, and an internalisation and 'policisation' of soldiering: while police forces are taking on military characteristics, and are extending their activities beyond the borders of the state, military forces are turning to internal security missions, and are adopting certain police features. Moreover, agencies which have traditionally been located at the interface between police and military forces, i.e. gendarmerie-type or paramilitary forces, are assuming an increasingly important role.

Terms such as "terrorism" and "anti-terrorism" have been thrust into modern vocabulary following post-9/11 conservative political agenda that has fuelled attempts to blur the boundaries between dissent or even crimes of property and what the state defines as acts of terrorism, particularly when these involve progressive movements (Wekerle and Jackson, 2005). Violence impedes human freedom to live safely and securely, and can sustain poverty traps in many communities. A key challenge for academics, policy-makers and practitioners working broadly in programmes aimed at poverty alleviation, including violence prevention, is the lack of reliable and comparable data on the incidence and nature of violence. Violence and poverty are inextricably linked, although the direction of causality is contested if not circular (Diprose, 2007).

Methodology

This paper employs a survey approach to the study of security-related construction costs of commercial buildings. A data collection proforma was designed to capture eighteen (18) different variables comprising physical characteristics of the buildings as well as costs of erecting the various elements of the buildings. The research instrument employed compares with those adopted by Al-Homoud and Khan (2004) in their study of safety design practices in residential buildings in Saudi Arabia, and Diprose (2007) in her work on internationally comparable indicators of violence, which relied on a questionnaire to elicit relevant information.

Data for this research work was sourced from quantity surveyors by a convenience sampling method that was supported by a snowballing methodology. Attempts were made to collect all of the available data that was relevant in line with the research design. Quantity surveyors were asked to suggest the names of others of their colleagues who might possess further relevant data. This technique (snowballing) resulted in the sourcing of a fair sized number of projects that had official documents (mainly bills of quantities) from where the research data could be extracted. Only 19 building projects that had data suitable for analysis were obtained in Minna. Inclusion of Abuja as a part of the study area resulted in the sourcing of an additional 30 building projects. This brought the total research data to 49 buildings which were used for the statistical analysis in this paper. These were buildings that had complete information on security-related costs, detailed in an elemental format. Line graphs of the data were plotted, in order to allow trends be examined visually. Quantification of the proportion of variation in the dependent variable (security-related costs) related to variations in the independent variables (total floor areas, and total areas of openings requiring protection such as doors and windows) were effected through the use of simple regression analysis.

The research data were analyzed using descriptive techniques of analysis in order to reveal any apparent patterns of location or dispersal of the data around the mean values as shown in table 1. The results of such data using analysis of variance (ANOVA) are presented in table 2. In addition, graphical illustrations were produced which provide visual evidence of patterns within the data. The results are presented in Figures 2, 3 and 4 in the appendix.

Discussion of Results

The results of the analysis of variance (ANOVA) statistical technique employed by the study in testing the validity or otherwise of the hypotheses are provided in Table 2 below. As previously detailed in this paper, hypotheses H_{o1} to H_{o3} were formulated to establish whether the mean values obtained differed significantly amongst the following characteristics of the projects sampled by the study: Type of use of building (residential, commercial or institutional buildings), number of floors in building (bungalow or multi-storey), and the location of the buildings (Abuja or Minna).

The mean values for the three types of use recorded for the sampled buildings were significantly different. Residential uses had a mean value of 806.97 Naira per square meter for total built-in security, while for commercial buildings the value was 328.81 Naira. Institutional buildings had the highest value of 1379.46 Naira per square meter. The calculated value of the F statistic was higher than the $F_{0.05}$ critical value (3.436 compared to 3.23). The $P_{0.05}$ value was lower than the 0.05 threshold (0.041). Null hypothesis H_{o1} was thus rejected for this analysis.

The mean values for the bungalow and storey buildings were highly differentiated. The bungalow buildings in the sample had a mean value of 529.03 Naira per square meter for total built-in security, while for storey buildings the value was 1059.41 Naira. The calculated value of the F statistic was lower than the $F_{0.05}$ critical value (1.118 compared to 4.08). The $P_{0.05}$ value was higher than the 0.05 threshold (0.296). Null hypothesis H_{o2} was thus accepted for this analysis.

The mean values for buildings in the two locations sampled by this study were highly differentiated. The buildings located in Minna in the sample had a mean value of 964.67 Naira per square meter for total built-in security, while for buildings located in Abuja the value was 323.91 Naira. The calculated value of the F statistic was higher than the $F_{0.05}$ critical value (5.650 compared to 4.08). The $P_{0.05}$ value was lower than the 0.05 threshold (0.022). Null hypothesis H_{o3} was thus rejected for this analysis.

Main Findings from Analysis

The following constitute the main findings from the analysis of data carried out thus far by this study.

i. Costs of built-in security in buildings were lowest for buildings subjected to commercial uses as opposed to residential or institutional uses.
ii. Costs of built-in security were also lowest for bungalow buildings as opposed to storey buildings, and for buildings located in Abuja, as compared to those located in Minna.

Findings and Discussion

Using Jerrell/Slevin management instrument, table 1 shows that Nigerian quantity surveyors do exhibit autocratic leadership style on the general note while only 2 of the identified categories exhibits shareholder and consensus styles. Based on the survey, the respondents were of the opinion that Nigerian quantity surveyors do exhibit more of task-oriented leadership style than other identified styles. Giritli and Oraz (2003) classified leadership styles into democratic and autocratic. The former was described as employee-centred and the latter was described as task-centred depicting a relationship between the result of the management instrument and the perception of construction professionals. As expected, laissez-faire leadership style – described as “hands-off˙ or “leave it be” style - was ranked least in term of execution by Nigerian quantity surveyors.

Conclusion and Recommendations

When the study data was segmented by various inherent characteristics such as use, height and location of the building, was homogenous in nature. The results showed that the total costs of built-in security differed significantly amongst the various uses of the building (P0.05 = 0.041). Such costs were lowest for commercial buildings, for bungalow buildings, and for buildings located in Abuja, as compared to those located in Minna. These results can be explained partially as being due to the fact that the commercial buildings included in the study sample were mainly simple market stall/warehouse buildings that had few openings, and thus lower costs of securing the buildings.

The costs of security for buildings of different heights were not significantly different (P0.05 = 0.296), even though bungalow buildings had a relatively lower value (529.03 compared to 1059.41 for storey buildings). This could be explained as due to the fact that the study data was skewed in favour of bungalow buildings. A more balanced data might have yielded a different result.

The costs of security for buildings located in Abuja was significantly different (P0.05 = 0.022); buildings located in Abuja had a relatively lower value (323.91 compared to 964.57 for buildings located in Minna). This could also be explained as due to the fact that the study data was skewed in favour of buildings located in Abuja. At the same time the buildings located in Abuja were mainly commercial buildings, which as observed earlier had lower costs of security owing to their architectural design peculiarities. All of the institutional buildings (which had high costs of security) were located in Minna.

This study makes the following recommendations:-

i. It was revealed that buildings subjected to commercial uses had the least cost of built-in security. However, the study recommended that appropriate designs that incorporate built-in security components should always be the focus/priority of the building owners. Most importantly Architects should always reveal the design implications of inclusion of the security-related components to their clients' right from the initial planning stage of the project.
ii. The buildings located in Abuja were mainly commercial buildings, which as observed earlier had lower costs of security owing to their architectural design peculiarities. All of the institutional buildings (which had high costs of security) were located in Minna. However, architectural designs for buildings should always include built-in security components which could forestall any future breach of security in the different types of buildings, such as commercial, residential, bungalow buildings and the likes.

Strategies for Implementations

The above recommendations can be implemented in the following ways;

i. Cost of items of built-in security in buildings should be based on full details of construction and timely preparation of working drawings should be encouraged.
ii. The actual costs of the components of the buildings, which would have been provided in a statement of final account, might yield results that would be different from that of this study.

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Appendix

Table 1: Descriptive Summaries of the research Data

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	statistic	statistic	statistic	statistic	statistic	statistic	statistic	statistic	statistic
TFA	49	2102	50	2152	445.78	438.431	192221.471	2.319	.340	6.147	.668
OpgArea	49	359	12	371	104.35	85.838	7368.148	1.297	.340	1.301	.668
WallArea	49	1081	71	1152	343.67	250.727	62863.849	1.456	.340	1.538	.668
OpgNum	49	114	6	120	37.94	29.151	849.767	1.525	.340	1.702	.668
ContractSum	49	66194497.87	1264479.38	67458977.25	10698979.4837	11713317.48403	137201806481755.300	3.031	.340	11.430	.668
TotalSecurity	49	4950000	0	4950000	238579.90	715887.272	512494586925.511	6.212	.340	41.138	.668

Source: Author's analysis of field work data,2008
Key: unit of measurement is Nigeria currency (Naira and kobo)

Table 2: Results of Analysis of Variance

Exp No	Variables (Mean values)			Observations				Inferences	
	Variable 1	Variable 2	Variable 3	Parameter tested	F_{cal}	F_{tab}	P_{value}	Rmk	Action on Hypothesis
1	Residential N806.97 (14)	Commercial N 328.81 (30)	Institutional N1376.46 (5)	Total costs of security (per m^2) segregated by use of building.	3.436	3.23	0.041	SS	Reject H_{o5}
2	Bungalow N529.03 (45)	Storey N1059.41 (4)	-	Total costs of security (per m^2) segregated by height of building.	1.118	4.08	0.296	NS	Accept H_{o6}
3	Minna N964.57 (19)	Abuja N323.91 (30)	-	Total costs of security (per m^2) segregated by location of building.	5.650	4.08	0.022	SS	Reject H_{o7}

Key: SS = Statistically Significant
NS = Not Significant
Rmk = Remark
Values in (brackets) refer to number of cases of the variable.

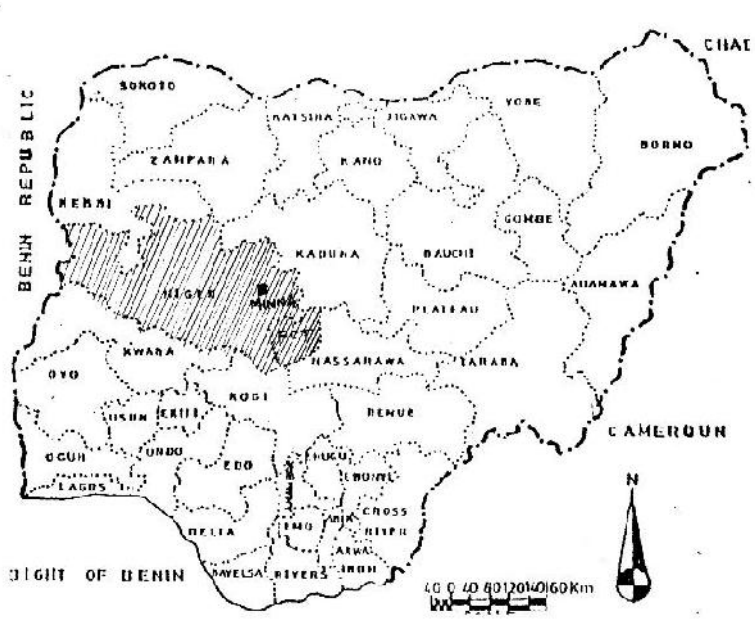

Figure 1: Map of Nigeria (the study area is shown hatched)

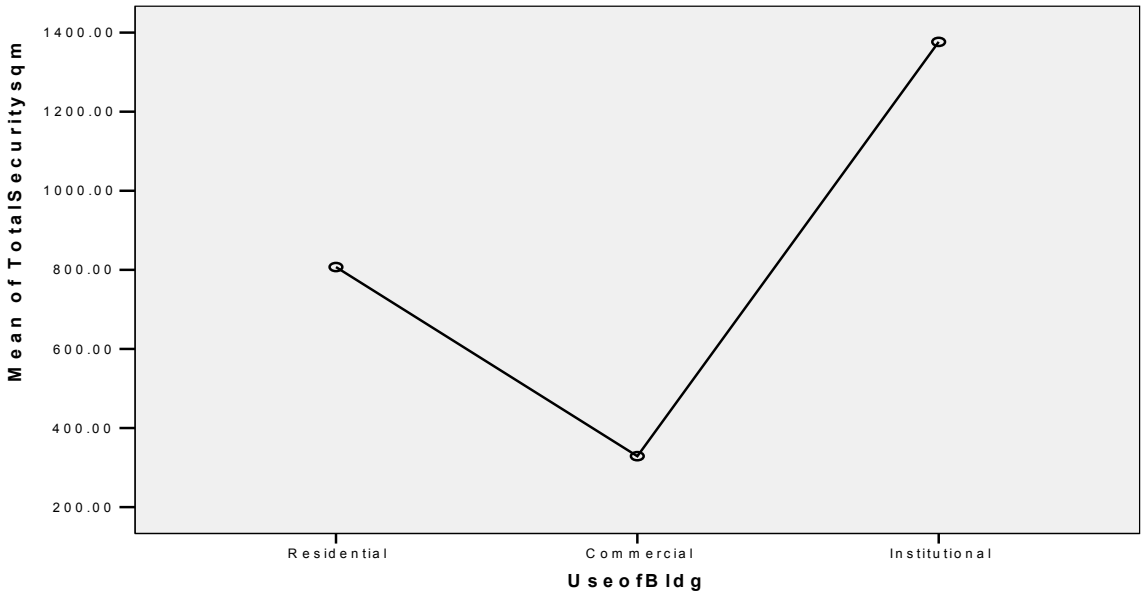

Figure 2: Total security costs per unit area compared amongst building uses.

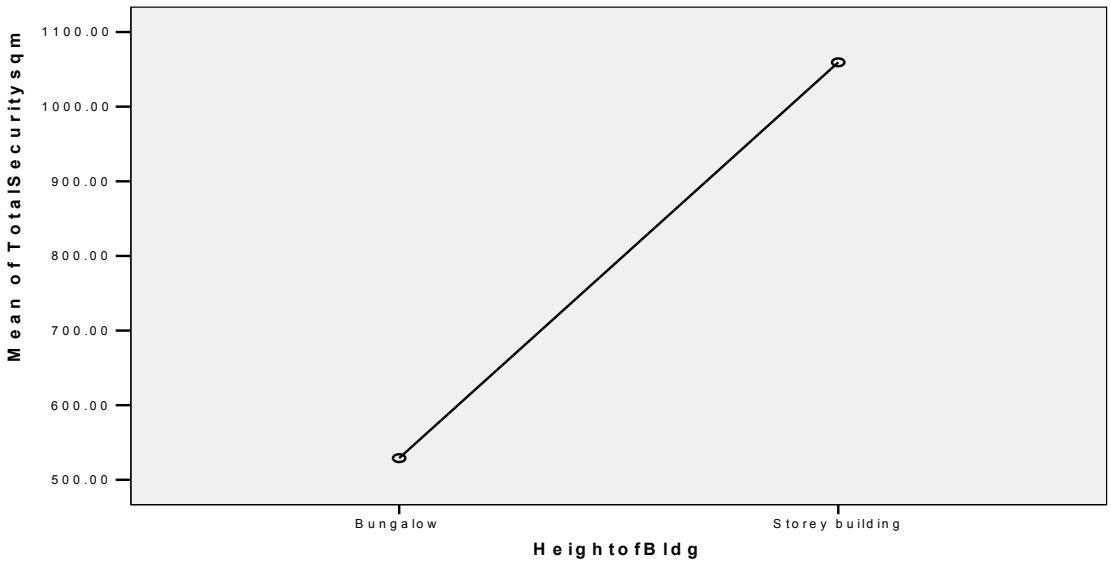

Figure 3: Total security costs per unit area compared between bungalow and storey buildings.

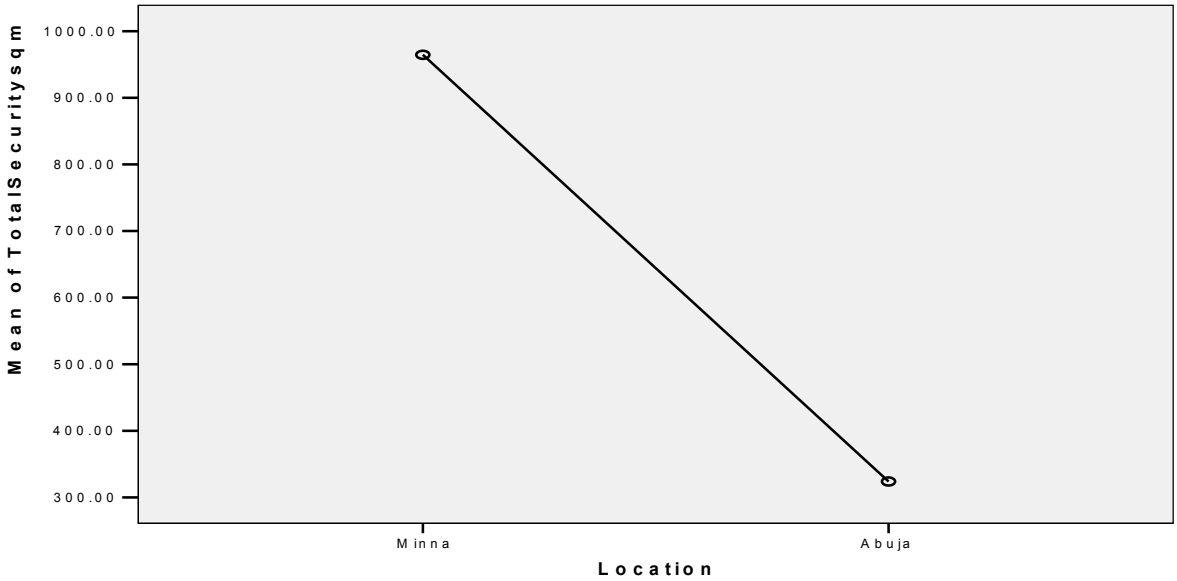

Figure 4: Total security costs per unit area compared by location of building.