Analysis of Investment for the Prevention of Crimes in Residential Bungalow Buildings: A Case Study of Kwara State

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ABSTRACT

The costs of installing building security have escalated as a result of inflationary trends. The study aimed at effecting an improvement in the security of lives and property within residential bungalow buildings. The objectives include determining the relationship between cost of built-in security and total cost of buildings. A pilot survey assisted in building up historical profile of trends in breaking and entering/burglary crimes in Kwara state over the period 1997 to 2001.The research data was obtained from field work. A Bill of Quantities for a designed residential bungalow building was used. The findings from data analysis revealed that costs of providing anti-burglar proofing and fence had a significant relationship with the aggregate cost of security (R-square of 39.8% and 61.6% respectively with P_{value} of 0.000, less than 0.05 degree of freedom). While, gate-house had a significant relationship with the Total Building Cost (R^2=35.8% &P_{value}=0.000, less than 0.05 degree of freedom). The study concluded that in four bedroom residential bungalow, only the cost of fence and gate-house relative to aggregate cost of security and the Total Building Costs can be planned and expected to provide a valid results .It was recommended that fence and gate-house should be the priority of the building type owners, while the design of burglary bars to windows and doors should always allow for escape route in case of fire incident or any other serious occurrences when used. This could be implemented by basing preliminary estimates on full details of construction, (e.g. working drawings).

Keywords:-**Built-in Security, Building cost, Crime, Inflation, Perpetrators, Prevention.**

1.0. 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 {a.k.a 419} embezzlement and drug-peddling. Crime takes place at different locations: at offices, homes, and recreational centers, in transit {cars, buses, railcars, and airplanes). However, crimes committed within residential buildings appear to be on the increase. Such crimes include burglary, breaking and entering, and armed robbery, Ogbunugafor (1995), Gashash (1996) and Ikoro (1997). The historical background of residential developments cannot be divorced from criminal activities committed within houses, usually following forceful entry by the perpetrators. The developments of houses for human residence have responded to the need to fortify buildings to forestall the commitment of crimes, (Allat,1984 ; Laycock,1985). Anthony and Paul (1992). Modern construction technologies attempt to fortify residential buildings in the following ways: - (i) By preventing easy entry by intruders, using

fences, gates and anti-burglar screens to windows and external doors. (ii) By discouraging prospective intruders using illumination at night such as floodlights, externally. (iii) By retaining the services of a guard; it thus becomes necessary to erect a shelter for the guard, hence the gate/guardhouse, [Chudley (1987), Albert (1991), Walton (1995)]. However, the thrust of this paper is in the influences of the cost of building in the above security measures on the total cost of such buildings.

1.1. Background of Study.

According to Ogbunugafor (1995), crimes and criminal activities escalated in Nigeria following the Nigerian civil war (1967-1970). This escalation became a national embarrassment a decade after the collapse of the Nigerian economy. The harsh effects of the various prescriptions for recovery also fuelled this escalation. New forms of criminal activities gained prominence in structural adjustment programmed (SAP) and post structural adjustment programmed (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. Data available on criminal activities from statutory authorities show that crimes committed at residences of the victims have escalated also. Table: 1.0 and figure: 1.0 below showing a historical profile of trends in breaking and entering/burglary crimes in Kwara state over the period of 1997- 2001.

It will be seen that over the five-year period covered {1997-2001}, burglary cases reported more than doubled. The spirit efforts being made by the federal government to equip and re-orient the Nigerian police to fight crime is also a pointer. According to Dongoyaro (1997), statutory response to growing crime has been multi-faceted; while the police are being strengthened, the prisons are also renovated and revisited, these in order to ensure that the criminals who are incarcerated come out as reformed and useful members of society. Another facet of the fight against crime is poverty alleviation.

Crime committed out of helplessness and necessity is an important part of the total tally. Another perspective to crime and its upsurge in recent years, particularly those committed at the victims residences, is the volume of personal disposable incomes that is applied to forestalling such crimes. House owners are continuously seeking new ways of fortifying their buildings. Components of buildings intended for security/defense against criminals are built-in as the buildings are constructed. It is almost now an accepted practice to screen all the external doors and windows with steel bars.

1.2. Statement of Research Problem

Building construction for residential purposes in Nigeria nowadays routinely includes

security conscious components such as fences, gatehouses, external lighting and anti-burglar screens to doors and windows. The rate of inclusion of these components in residential bungalow buildings tend to imply that they are so necessary and that the costs involved are no longer a deciding factor. Such costs do however inflate the total cost of construction. The behavior of such costs relative to the total building cost is so far unknown. This study thus intends to reveal the magnitude and implications on cost planning of the relationships between expenditures on building structures and building security.

It has already been stated that criminal activities, especially within and at victim's residences are on the increase. It is also an assertion that buildings cost more nowadays because of increased expenditure on building security. In the light of these assertions on current situations of building security and cost, this research becomes necessary for the following reasons. (1) The spate of increased tenancy by Nigerians indicates that more Nigerians are unable to build and own houses. There is a need to reverse this trend. If building security turns out to be a significant part of the total cost of a building, then more money will be expended on fewer buildings, and less people can own houses. (2) The inflationary trends since 1980, have forced up the comparative costs of constructing similar buildings. Costs of acquiring building security have escalated as well. If there exist any form of relationship between costs of building security and total building costs, such relationship will be important for planning purposes. This study intends to discover if such relationship exists. The results will therefore be of help to construction industry operators involves in the cost-planning of building costs, in an inflationary atmosphere.

1.3. Aim and Objectives of the Study

This research paper is aimed at effecting an improvement in the security of lives and property within buildings through an improved understanding of the relationships between the various costs incurred in acquiring built-in physical security in residential developments.

The objectives of this study are as follows:

(i) Determining the relationships that may exist between the costs of built-in security {i.e. costs of burglar proofing,

Perimeter fencing, external lighting and gatehouse}, and the total costs building.

(ii) Examining the influence of each aspect of costs of built-in security {i.e. burglar proofing, perimeter fencing, external lighting and gatehouse}, on the total costs of built-in security.

1.4. Assumptions and Limitations of the Study

This research study makes the following assumptions in order to ensure the validity of the experimental results.

(i) It was assumed that the design chosen reflects the predominant features of residential bungalow buildings in existence.

(ii) It was also assumed that the owners of residential bungalow buildings often includes anti- burglar screens, gate-house, fence and external lighting and they are more interested in the security values of these components rather than the aesthetics values.

(iii) A further assumption was that the prices obtained for the elements and components in the residential bungalow buildings chosen were true reflections of the costs of the various aspects of such buildings as contained in the research bill of quantities.

The limitations of the applicability of the results of this research study are as detailed below.

(i) The study is limited to four bedrooms flat residential bungalow buildings, that comprises all elements and Components detailed in the research Bill of Quantity {B. O. Q}.

(ii) The study is limited to Kwara state only. The levels of costs obtained reflected the prices of the corresponding elements or components in Kwara State.

(iii) This study considers only four aspects of building security, namely (a) Anti burglar proofing, (b) Gatehouse, (c) Fencing and (d) External lighting. Other aspects such as the maintenance of security patrols and intruder alarm systems are not covered by this study.

1.5. The Study Area (Kwara State)

Plate 1: Map of Nigeria showing the States and International boundaries

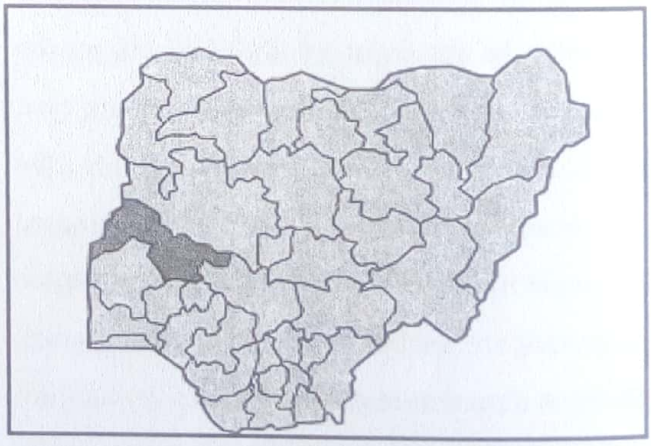

Plate 2: Map of Nigeria showing the location of Kwara State

1.5.1 Socio-political context of the study

This research study was undertaken in Kwara state of Nigeria. Kwara state was created on the 27th May, 1967. At the time of its creation, the state comprised the old Ilorin and Kabba provinces of the them Northern Region of Nigeria and was originally known as the central western state.When it was created in 1967, the land area of Kwara state extended from Borgu area in the north-west to the eastern limit of the present Kogi state in the east. Further states and boundary readjustment

exercises in the country by successive military administration since 1967 have led to considerable losses in both land area as well as human and material resources of Kwara state. A land area of about 60,388 sq.km and a projected population figure of over 4.0 million to the 1991 state creation exercise. The post-1991 figure are 32,500 sq.km for land area and 1.57 million people for population. The population density of Kwara state was thus 48 persons per sq.km. Presently, Kwara state comprises sixteen (16) local government areas and comprises about 50 administrative districts. The local government areas are of different sizes both in terms of population and territorial size or extent.

1.5.2. Geographical context of the study

Kwara state is situated between parallels $11^0 7'$ and $11^0 45'$ north latitude and $2^0 45'$ and $6^0 40'$ east longitude. It has an elongated shape running from west to east and covering an area of about 31,000 square kilometers. It occupies a strategic position in the country as it is situated about mid-way between the north-west and the along its northern and eastern margins and shares a common internal boundary with Niger state in the north, Kogi state in east, Oyo, Ondo and Osun state in south and an international boundary with the Republic of Benin in the west, Oyebanji, (1993).

2.0. RESEARCH METHODOLOGY

The research methodology for this study is divided into two areas; these are (i) the type and sources of the research data, (ii) the methods and instruments for the analysis of the research data and, (iii) the study area.

2.1. The Type and Sources of the Research Data

The data for the research was primary data obtained from fieldwork. The instrument for its collection was a bill of quantities for a chosen design for four bedrooms flat residential bungalow buildings. Draft bill of quantities were used to obtain cost data on built-in security components, in order to limit variations in design, construction techniques and materials to an acceptable minimum.

2.2. Method of Analysis

The study employed both descriptive and inferential analysis. Statistical inferences were drawn from the results of (i) regression analysis, and (ii) descriptive analysis of graphs and charts. Simple regression analysis (SRA) and analysis of variance (ANOVA) were employed in the analysis of all experiments. The descriptive method employed by the study consisted of frequency classification of data in tables. The inferential analysis comprised simple linear regression, correlation, and analysis of variance (ANOVA).

The application of statistical techniques within this study was guided by certain criteria. These are as follows:- (i) the null hypotheses, (ii) the tabulated value for the selected test statistic

corresponding to the sample size, number of variables, and level of probability used, and (iii) the calculated value of the test statistic. The decision rule for all experiments undertaken within this study was thus: - (i) H_o: $F_{0.05} < F_{calculated}$ = Reject, (ii) H_o: $F_{0.05} < F_{calculated}$ = Accept.

2.3. Research Data

The research data comprised the costs of built-in-security components of thirty proposed middle-income buildings in Kwara state. The variables employed were the costs of providing built-in-security of the following kinds: - (i) Anti-burglar protection to all openings, (ii) Gate-house, (iii) Fence including gate and (iv) External electrification. For comparative purposes, costs of three important elements:- (i) Substructure, (ii) Walls and (iii) Roofing were also employed as variables. The eight and ninth variables were the total cost of built-in-security components and the total building cost (TBC). The values for all the nine variables were thus obtained in monetary terms i.e. naira and kobo.

Table .1.0: Trend in Burglary Breaking and Entering Crimes in Kwara state {1997-2001}.

Year	No. of crimes committed
1997	180
1998	227
1999	261
2000	479
2001	419
Total	1566

(Source: Nigerian police, state command, Kwara state, {2002}.)

Table 2.0: Data Used for the research

Total Cost Of Building	Investment for Security				Costs of Important Elements			
	Anti-burglar protection	Gate house	Fence	External electrification	Total Cost Of Security	Substructure	Walls	Roofing
9.20	0.122	0.14	0.88	0.17	1.32	0.81	0.62	1.01853
8.24	0.123	0.23	1.17	0.17	1.69824	1.03	0.63	1.16056
8.24	0.152	0.19	1.50	0.02	1.855223	1.10	0.51	2.134225
8.25	0.123	0.24	1.19	0.17	1.728165	1.07	0.58	1.08314
8.26	0.1412	0.16	1.71	0.02	2.02816	0.89	0.63	1.42887
6.59	0.13785	0.14	1.74	0.02	2.04115	0.73	0.81	0.79581
7.98	0.2316	0.18	1.21	0.02	1.638585	1.00	0.69	1.74613
10.13	0.982	0.19	1.39	0.02	2.586438	1.12	0.66	1.485242
7.38	0.1502	0.17	1.52	0.03	1.86575	1.03	0.49	1.3243
9.22	0.388	0.16	1.22	0.08	1.843395	1.06	0.63	1.08831
5.64	0.35822	0.14	0.97	0.03	1.486265	0.89	0.39	0.238943
6.85	0.1372	0.14	1.15	0.01	1.443515	0.84	0.71	1.11286
8.74	0.183	0.19	1.29	0.01	1.672784	1.11	0.78	1.861435
8.79	0.173	0.19	1.31	0.01	1.688784	1.10	0.78	1.861435
6.63	0.1264	0.14	1.14	0.01	1.42042	0.84	0.71	0.9688
8.12	0.1688	0.19	1.72	0.02	2.092575	0.96	0.50	1.52672
7.02	0.1442	0.15	1.18	0.01	1.48286	0.86	0.74	1.03409
9.49	0.973	0.19	1.39	0.01	2.567349	1.12	0.66	1.51163

9.83	0.149	0.22	1.64	0.02	2.03564	1.13	0.50	1.430515
7.18	0.1507	0.15	1.20	0.01	1.51576	0.86	0.74	1.15409
10.13	0.0936	0.19	1.15	0.01	1.448685	0.76	0.77	1.74785
10.11	0.09845	0.20	1.09	0.01	1.40317	0.77	0.80	1.78271
9.57	0.3386	0.21	1.90	0.03	2.484937	1.20	0.73	1.44167
10.63	0.1013	0.22	1.13	0.01	1.45798	0.79	0.83	1.86517
8.78	0.25476	0.20	1.33	0.02	1.802444	1.10	0.76	1.920743
10.37	0.122	0.17	0.90	0.17	1.355955	1.02	0.58	1.53384
10.55	0.26	0.20	1.39	0.11	1.967393	1.08	0.61	1.39311
7.25	0.151635	0.16	1.92	0.02	2.245266	0.81	0.89	0.875391
9.08	0.15532	0.17	1.89	0.02	2.230977	0.98	0.69	1.571757
8.23	0.432	0.17	1.20	0.04	1.839935	0.84	0.52	1.31398

(Source: Author's fieldwork, 2006). *Units= [₦ millions]*

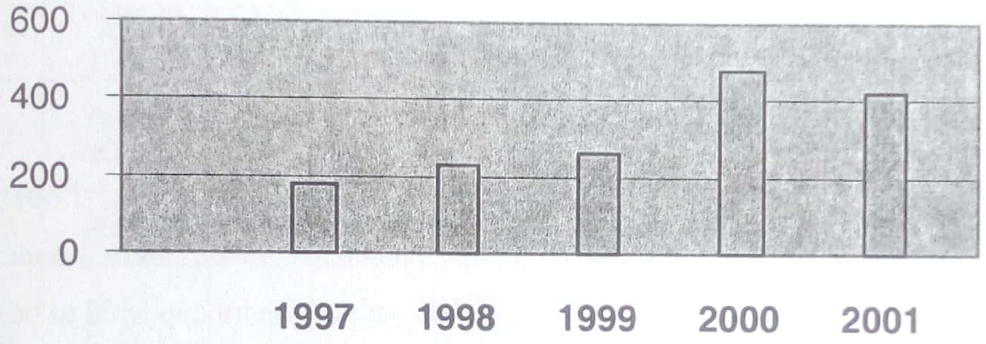

Figure 1.0: Trend in burglary breaking & entering crimes in Kwara state

(Source: Author's analysis of field work data, 2006).

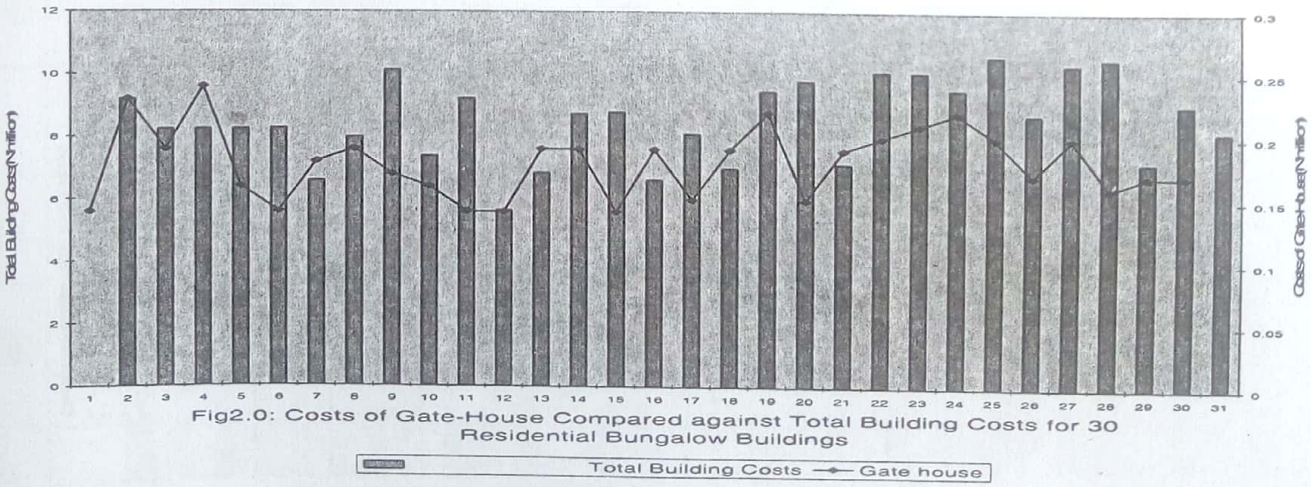

Fig2.0: Costs of Gate-House Compared against Total Building Costs for 30 Residential Bungalow Buildings

(Source: Author's analysis of field work data, 2006)

Gate-house had a maximum value of ₦0.25 million while total building cost (TBC) had ₦ 11.00 million, corresponding minimum values were ₦5.00 million for TBC and ₦0.15 million for gate-house. The variation in the range of values for the variables was narrower in case of gatehouse (0.13, 0.25) and, also narrower in case of TBC (5,11). Generally, the values of Gatehouse were about 2.19% of TBC values. There appeared to be a positive correlation in

the trends of the variables. Moreover, there were no exceptional values in the case of both variables.

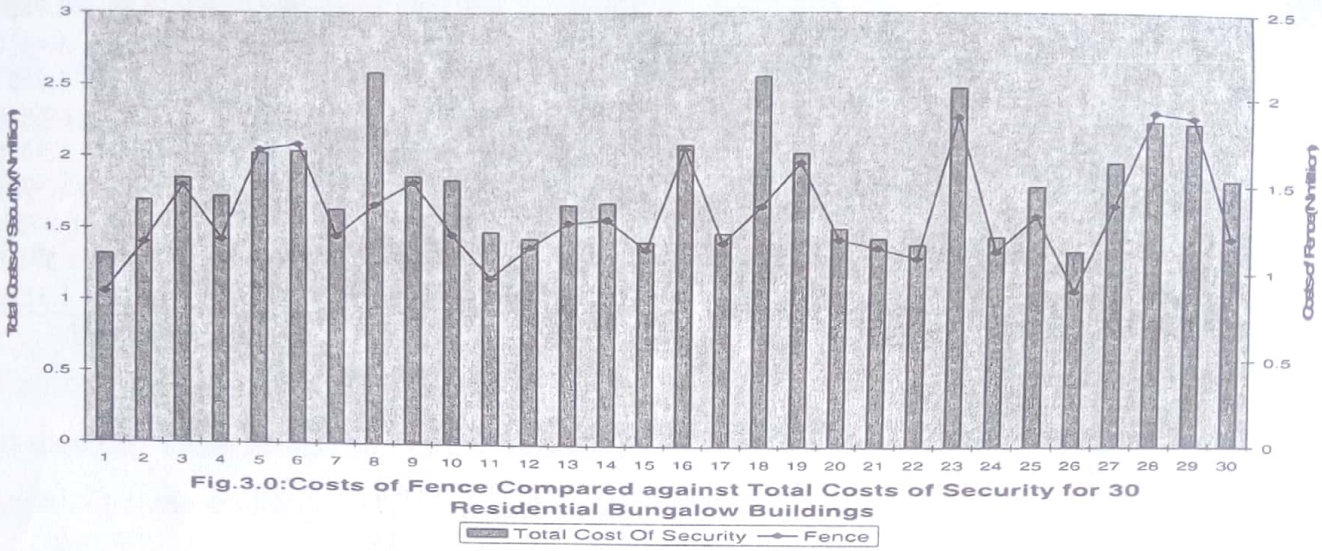

Fig.3.0:Costs of Fence Compared against Total Costs of Security for 30 Residential Bungalow Buildings

(Source: Author's analysis of field work data, 2006)

Fence had a maximum value of ₦2.00 million while total cost of built-in-security (TCBIS) had ₦2.60 million; corresponding minimum values were ₦1.40 million for TCBIS and ₦0.30 million for fence. The variation in the range of values for the variables was partially wider in case of fence (0.04, 1.80) and narrower in case of TCBIS (1.40, 2.60). Generally, the values of fence were about 73.53% of TCBIS values. There appeared to be a positive correlation in the trends of the variables. However, there were no exceptional values in the case of the variables.

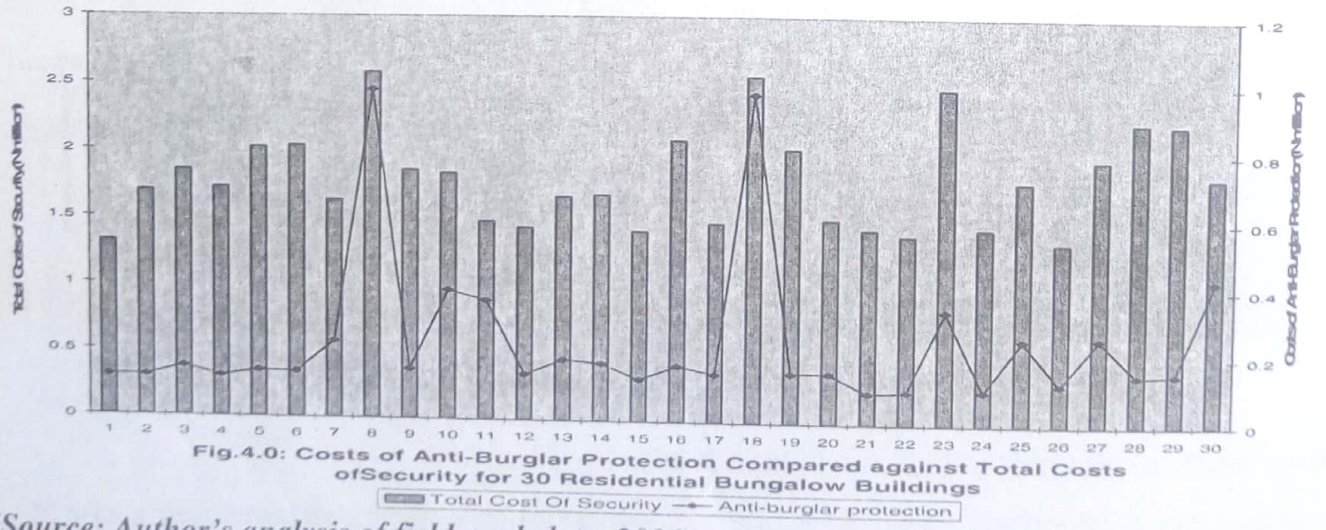

Fig.4.0: Costs of Anti-Burglar Protection Compared against Total Costs ofSecurity for 30 Residential Bungalow Buildings

(Source: Author's analysis of field work data, 2006)

Anti-burglar protection (ABP) had a maximum value of ₦1.00 million while total cost of built-in security (TCBIS) had ₦2.60 million, corresponding minimum values were ₦1.40 million for TCBIS and ₦0.10 million for ABP. The variation in the range of values for

the variables was wider in the case of ABP (0.1, 1.0) and narrower in case of TCBIS (1.40, 2.60). Generally, the values of ABP were about 11.76% of TCBIS. There appeared to be a positive correlation in the trends of the variables. However, the values for ABP at row 8 and 18 were exceptionally high.

Table3.0 Summary of Results based on Simple Regression Analysis

EXP NO.	Variables		Type of Analysis	OBSERVATION					INFERENCE	
	X	Y		Regression Equation	R^2%	F.cal	F.tab	P.Value	Strength of relation-ship	RMKS
1	ABP	TBC	Linear	TBC= 8.2569+1.2314 ABP	4.2	1.21	4.20	0.279	Very weak	NS
2	GATE HOUSE	TBC	Linear	TBC=3.5364+27. 9015 G.HOUSE	35.8	15.63	4.20	0.000	Weak	SS
3	FENCE	TBC	Linear	TBC =8.8152- 0.1973 FENCE	0.2	0.05	4.20	0.820	Very weak	NS
4	EXT ELECT	TBC	Linear	TBC=8.3194+5.3 059 EXELECT	4.8	1.41	4.20	0.245	Very weak	NS
5	SECU- RITY	TBC	Linear	TBC =7.3973+0.6371 SECURITY	3.0	0.87	4.20	0.359	Very weak	NS
6	SUBS	TBC	Linear	TBC =5.4590+3.2080 SUBS	11.0	3.47	4.20	0.073	Very weak	NS
7	WALLS	TBC	Linear	TBC = 7.6249+1.3908 Walls	1.5	0.45	4.20	0.510	Very weak	NS
8	ROOF	TBC	Linear	TBC = 5.6980+2.0656 ROOF	39.9	18.61	4.20	0.000	Weak	SS
9	ABP	SECU - RITY	Linear	SECURITY = 1.5615+1.0393 ABP	39.8	18.54	4.20	0.000	Weak	SS
10	GATE HOUSE	SECU - RITY	Linear	SECURITY=1.27 39+2.9741 G.HOUSE	5.5	1.62	4.20	0.213	Very weak	NS
11	FENCE	SECU - RITY	Linear	SECURITY = 0.4943+0.9752 FENCE	61.6	44.99	4.20	0.000	Strong	SS
12	EXT ELECT	SECU - RITY	Linear	SECURITY = 1.8723-1.4771 EXT ELECT	5.0	1.48	4.20	0.224	Very weak	NS

(Source: Author's analysis of field work data, 2006)

Definitions: TBC=Total Building Cost, ABP= Anti-burglar proofing, EXELECT= External Electrification, SECURITY=Total Cost of security, SS= Statistically Significant, NS=Not Significant, R^2=coefficient of statistical significance, $P._{value}$= Probability value.

3.0 Discussion of Results and Analysis

With regard to four bedroom residential bungalow buildings, the costs of individual security elements such as burglar proofing, fence and external electrification cannot be determined from knowledge of the Total Building Cost alone. This is based on observed values of coefficient of statistical significance (R^2) that range between 0.2% and 4.8% obtained in Experiment 1, 3, and 4. Only gate-house had a significant relationship with the Total Building Cost, given R^2 value of 35.8% and P value of 0.000, less than 0.05 degree of freedom for gate-house was accepted. However, increases in the security elements (i.e., burglar proofing, gate-house, and external electrification) increases in the will result in increased Total Building Cost, given positive correlation in experiments 1, 2 and 4. The correlation was negative for fence, the cost of which reduces as the Total Building Cost increases, (Experiment.3). Based on the results of these experiments hypotheses Ho_1, Ho_3 and H_{04} were therefore rejected. However, from the second group of the experiments, the Total Cost of Security, substructure, walls and roof, only roof from this group can be determined from the knowledge of the Total Building Cost alone. This was based on observed R^2 value of 39.9% and P value of 0.000 obtained in experiment 8.

Increases in costs of individual element from this group, will results in increased Total Building Cost, given positive correlation in experiments (5, 6, 7 and 8). Based on the results of these experiments, hypotheses Ho_5, Ho_6, and Ho_7, were therefore rejected. Also, from the last group of the experiments the cost of individual security elements such as burglar proofing, gatehouse and external electrification cannot be determined from knowledge of the Total Cost of Security alone. These were based on observed values of R^2 that range between 5.0% and 39.8% obtained in experiment 9, 10 and 12. On the other hand, the cost of fence can be determined from knowledge of Total Cost of Security given R^2 values of 61.6% obtained in experiment 11. Thus, increases in the costs of individual security elements (i.e., burglar proofing, gate-house, and fence) will results in increased Total Cost of Security, given positive correlation in experiments 9, 10 and 11. The correlation was negative for external electrification, the cost of which reduces as the Total Cost of Security increases, (Experiment 12). Based on the result of these experiments, hypothesis Ho_9, Ho_{10} and Ho_{12} were therefore rejected, while hypothesis Ho_{11} with R^2 values of 61.6% and P value of 0.000, less than 0.05 degree of freedom for fence was accepted.

4.0 Conclusions

Only gate-house had a significant relationship with the Total Building Cost, while, anti-

burglar proofing and fence had a significant relationship with the Total Cost of Security. The importance of these results is that for cost planning purposes, only the cost of anti-burglar proofing, fence and gate-house relative to aggregate cost of security and Total Building Cost can be planned and expected to provide a valid results. All other relationship of cost components cannot be expected to produce firm and validly applicable results.

4.1 Recommendations

This study makes the following recommendations for prevention of crime in residential bungalow building: -

(i) The house owner's should always include the construction of a perimeter fence and gate-house for the guard at earliest stage of the project as this will serve as the major crime deterrent.

(ii) The use of burglary bars in windows and doors of residential bungalow buildings should be the optimist priority to the house owner's.

(iii)The design of burglary bars to windows and doors should always allow for escape route in case of fire incident or any other serious occurrences when used.

4.2 Strategies

The above recommendations can be implemented in the following ways.

(i) Cost of items of built-in security in buildings {perimeter fence and gate-house}, should be based on full details of construction. Working drawings must be prepared in time.

(ii) Quantity surveyors should be involved at the earliest possible stage in the design of buildings for effective cost planning and monitoring.

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