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Evaluation of building security costs determinant within the built environment in Minna, Niger state, Nigeria

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Abstract

Building equipped with protective measures is exceedingly restricted but it brings about a moderately high increment in expenses of building security and the general cost of the home. This study aims at assessing the built environment experts' perception of factors affecting the cost of maintaining security in houses as a part of sustainable building security cost. The study employed mixed methods sequential exploratory design to source data primarily from the respondents. Purposive and convenience sampling were used for data collection while descriptive statistics and inferential were employed for data analyses. The results revealed insignificant difference in respondents' perceptions on building security costs. The top ranked respondents' perceptions were from Builders, Quantity Surveyors and Architects with total mean scores of 267.08, 234.66 and 234.63. No significant variations were shown among the mean scores of the items ranked. This is an indication that all items are important therefore having effect on building security costs. The study concluded that external wall openings access prevention, size of building, perimeter fence and protection are some of the key criteria for measuring building security costs. The study sensitizes the built environment experts, criminologists and policy makers about the implication of the established factors on building security costs.

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Introduction

The urban communities of the 21st century are perplexing substances that arose as a result of urbanization and globalization. They are an accumulation of the great and the awful parts of urbanization. They mirror the trust and the trepidation of the cutting edge world. As the urban communities offer open doors for development and the formation of riches, they are additionally confronted with issues of disaster, crime and insecurity amongst others. Urban insecurity is a noteworthy issue of concern in all countries (Hove *et al*., 2013). Crime is a financially critical activity that is totally neglected by the economist. Nevertheless, the neglect makes the financial aspects of crime a moderately new field for economic exploration as few reports and studies affirmed the increment in criminal exercises in Nigeria (Omotor, 2010). On the other hand, the more extensive writing on the impact of self-defensive measures on exploitation tends to disregard concurrence in the connection between efforts to establish safety and crime (Vollaard and van Ours, 2011).

The current writing on the regulation of building security is either elucidating in nature or small-scale local mediation (Vollaard and van Ours, 2011). According to Tseloni *et al*. (2014), the procurement of security gadgets for the protection of lives and property in buildings are often left to the discretion of individual homeowners, with no government supports. Moreover, Ceccato and Lukyte (2011) bring to light the approaches on which the Western Europe based their analysis of safety. The most common approach is by analysing the trend and spatial patterns of crime in official statistics. Next is by analysing fear of crime in urban safety research while the last approach is by evaluating public engagement and participation in prevention of crime. Therefore, "police are no longer the sole providers of security in the Western European cities; a multiplicity of institutional forms is now involved in the delivery of policing and security services and technologies. Some of these initiatives do have an effect on crime and fear of crime while others are criticised as being problematic and producing unwanted results". To tackle these problems, Ceccato and Lukyte (2011) recommend a situational crime prevention approach to include design-based intervention coupled with the implementation of technological surveillance devices such as closed-circuit television in Vilnius. Also, facts from a natural experiment in the regulation of built-in security components demonstrated that structures braced with security components and devices were exceedingly restricted (Vollaard and van Ours, 2011). However, this has brought about a moderately high increment in expenses of building security and the general cost of the home.

Building security is gaining more prominent significance against this scenery of an ascent in criminal activities (Anifowose *et al*., 2016; Tseloni, 2006). However, the empirical connections between protective measures in building, building characteristics and costs of maintaining safety in buildings are yet to be determined despite the multiplication of reported frequencies of burglary, armed robbery, terrorism, breaking and entering, (Tseloni, 2006; Vollaard and van Ours, 2011). Therefore, it is necessary to assess the determinants factors of building security costs. The factors that constitute the cost and those factors that influence the cost of building security within the built environment adopting mixed methods sequential exploratory design is necessary as a result of the paucity of literature available on the cost of building security. This research emanates from insightfulness and critics among the experts, on the cost effectiveness of the situational crime prevention techniques. Thus, this study seeks to explore the cost influencing factors, determining the level of importance of the factors for effective evaluation of building security cost within the built environment in Nigeria.

Situational Crime Prevention

Situational Crime Prevention focuses on preventing opportunity for crime to occur by addressing: (i) factors within a given location that create a crime hotspot, and (ii) characteristics that may make some people more vulnerable to victimisation than others. According to Felson and Boba (2010), "Situational prevention comprises opportunity-reducing measures that are: (i) directed at highly specific forms of crime, (ii) involves the management, design or manipulation of the immediate environment in a systematic and permanent way as possible, and (iii) make crime more difficult and risky, or less rewarding and excusable as judged by a broad range of offenders". This theory has taken a different direction, away from most criminology in its orientation (Bruns, 2015). The theory introduces separate managerial and environmental change to reduce the opportunity for those crimes to take place based on a study of the circumstances giving rise to a particular type of crime. Previous studies have proven situational crime prevention successful through the use of strategic measures such as surveillance camera for parking facilities and subway system, defensible space architecture in public and private houses, target hardening of apartment blocks and individual houses, electronic and mechanical access (Marzbali *et al*., 2012a). Table 1 presents the techniques of situation crime prevention related to burglary.

Table 1: Techniques of Situational Crime Prevention Related to Burglary

Increase the effort	Increase the risks	Reduce the Rewards
1. Harden Targets Roller shutter	6. Extend guardianship Rent premises to community groups outside business hours	11. Conceal targets Store high value items in cupboards
2. Control access to facilities Alley gates	7. Assist natural surveillance Low shrubbery	12. Remove targets Frequent banking of cash
3. Screen exits Alarm escape points	8. Reduce anonymity Require staff wear ID	13. Identify property Microdot high value items
4. Deflect offenders Limit street access to premises	9. Utilise place managers Appoint managers with security responsibilities and expertise	14. Disrupt markets Regulate second hand stores
5. Control tools/weapons Clear building surrounds of implements for breaking and entering	10. Strengthen formal surveillance Link CCTV control room to on-site security patrol	15. Deny benefits Mark property

Source: (Cornish and Clarke, 2014; Cozens, 2008)

Despite the fact that situational crime prevention has recorded much success, it is rarely been accorded attention in policy debates about crime control by criminologist and experts (Clarke, 2009). The neglect was attributed to the failure of modern criminology in mis-explaining the problem of crime and criminal. The second mistake was accredited to confusing the problem of controlling crime with dealing with the criminals (Britt and Gottfredson, 2011). However, these have been a two-dimension approach to crime prevention discussed by most books involving constituted legal institution of law and criminal justice system designed to sanction offenders. Thus, the third aspect of crime control measures that

intertwined and depended on formal and informal social control has also been neglected. The criminologist and policy analysts assumed that the principal value of the situational crime precaution was not in reducing overall crime rates, but in protecting individual and agencies from victimisation as a result of been particularly targets of specific types of crime or places of crime occurrences. However, this and many other assumptions of criminologist were stated to be lacking empirical support. Cornish and Clarke (2014) stated that the need to tailor measures to particular offences should not be taken to imply that offenders are specialists. However, the commission of certain types of crime relies critically on a collection of particular environmental opportunities and requires cogent measures to block specific type of crime. According to Kennedy (1993), cited in Cozens *et al.* (2001) focus is on the designer and manager of urban fabric. The study highlighted the issue of the premises liability that any criminal attack on their invitees, tenants and guests could be attributed to poor design if the designer and manager failed to take sufficient security precautions.

Situational crime prevention depends on an extensive compilation of literature to support the variety of techniques of situational prevention. The empirical validity that supported this theory and most relevant to this current research is Clarke (2009) which "concluded that an increase use of access controls in a British housing estate (entry phone, fences, and electronic access to buildings) led to a significant reduction in vandalism and theft. Category: increasing the effort through control access to facilities". Also, Marzbali *et al*. (2012b) concluded that tactics such as access control, natural surveillance, street lighting, and property identification may decrease crime rates without leading to displacement. However, they warned that the enthusiasm surrounding situational crime prevention must be tempered by the weakness of the methods used in most existing evaluation studies. The concept of situational crime prevention is built on the assumptions that more opportunities lead to more crime, easier ones attract more offenders, and such existence of easy opportunities makes possible for a "life of crime". Clarke (2009) introduced science and art approach to decrease the amount of opportunities for crime. Employed, "measures directed at highly specific forms of crime that involve the management, design, or manipulation of the immediate environment as systematic and permanent way" instead of reforming the offenders themselves. However, the major criticism put up by criminologist against the situational crime prevention theory is about its *costs*. They believe "strengthening deterrence by increasing the weight of punishments would be easier than manipulating the opportunity structure (with costs and inconveniences)". The issue with the critique is that the offenders have reported higher fear of getting caught rather than the details (length, location, strength) of the punishment they would potentially receive if caught (Felson and Boba, 2010). Increasing the risks of being caught is thus a key category of the situational crime prevention theory (Clarke, 2009). However, the fortifications of houses with security measures do have some financial implication attached to it, sometimes too expensive and at times not available to the average citizen.

Previously conducted study on imprisoned property offenders reveals the effectiveness of the different security measures against burglary. Thus, the highest ranked on the list included: (i) burglar alarm system connected to law enforcement agencies, (ii) electronic window sensors, (iii) closed circuit television (CCTV), and (iv) security patrols. Such measures come at enormous costs to individual households. Hence, it is evident that the security of persons and properties are important to both individuals and government. According to investment for protection of lives and property is at the (Tseloni *et al.*, 2014) discretion of individual households. It is evident that poorer households in the society are often unable to afford the installation of physical security measures. Provision of target hardening to households as part of crime prevention campaign in the UK is limited in scope. Thus, when available, usually targeted at more the vulnerable such as elderly people regardless of whether or not they are shown to be at greater risk (Grove *et al*., 2012). Households in the rental sector also require the cooperation of landlords to make changes to their residence, which may not always be forthcoming. Household anti-burglary security

comes in a variety of forms, and there is mixed evidence about their effectiveness: it appears that some devices are more effective in thwarting burglaries than others. Homes with no or low-level security have seven times and 75%, more burglaries than homes with high-level security (Pease and Gill, 2012). In line with the views of other researchers, Anifowose and Said (2016) explored the cost influencing factors of building security within the Nigerian urban environment and came up with 11 factors under two categories. The first category "Security features" include: (a) Access prevention (b) Intruder detection (c) Perimeter fence, perimeter protection, and security-house, (d) Security lighting. While the second category "building characteristics" includes: (a) Location of building, (b) Height of building, (c) Size of building, (d) Use of building, (e) External wall openings, (f) Plan shape, (g) Aesthetics. However, it is evidenced from the available literature that works on empirical relationships between security cost determinant and building security features have not received detailed research attention. This study therefore seek to evaluate the built environment experts' perceptions on key determinant factors influencing buiilding security cost.

Materials and Methods

Study design

This study employed mixed methods sequential exploratory design to source data primarily from the respondents. According to Creswell (2013), sequential exploratory design is not only useful to the researcher who wants to explore a phenomenon, but also for those that want to expand on the qualitative findings. The earlier part of this study presented the result of the open-ended questions and written comments on questionnaires conducted on respondents to generate the essential factors in a paper titled exploration of cost influencing factors on building security (Anifowose and Said, 2016). Similarly, the latter part of this study presented the results of Kruskal-Wallis test carried out to reveal the built environment experts' perception of factors affecting the cost of building security. Pallant (2011) described Kruskal-Wallis Test as a non-parametric alternative to a one-way between-groups analysis of variance (ANOVA). This test allows the researchers to compare the scores on some continuous variable for more than two groups and do not have such stringent requirements and do not make assumptions about the underlying population distribution. However, the data for this study do not meet the stringent assumption of the parametric techniques as a result of small sample size obtained from the field hence the choice of Kruskal-Wallis Test.

Furthermore, this study relies on survey structured questionnaires to source relevant information from the respondents in order to advance on the initial part of this study. According to Sekaran and Bougie (2009), questionnaire is an efficient data collection instrument. However, the focus of this study is to the built environment professionals such as Architects, Builders, Quantity Surveyors, Urban and Regional Planners and Estate Surveyors and Valuers that are registered under their recognized professional bodies or institutions. The purpose of the research is to assess the experts' insightfulness on factors affecting building security cost within the built environment.

Research population

Population is "the entire group of people, events, or things of interest that the researcher wishes to investigate" (Sekaran & Bougie, 2009). The population of interest for this research are the registered professionals within the built environment in Minna, Niger state, Nigeria, which comprise of Architects, Builders, Quantity Surveyors, Urban and Regional Planners and Estate Surveyors and Valuers. These are professionals assumed to have relevant experience and technical background in design, evaluation, planning and construction of Building within the built environment.

Sampling procedure

Due to the disparity in discipline and number of registered professionals involved in this study, the qualitative part of this study employed purposive sampling. According to (Morgan, 1997) cited in Onwuegbuzie and Leech (2007) minimum sample size of ≤ 10 and ≥ 6 for qualitative research design, were suggested. Therefore, a total of ten professionals (2 each) from Architects, Builders, Quantity Surveyors, Urban and Regional Planners, Estate Surveyors and Valuers were selected for the study. The purposive sampling was employed in this

study to explore the determinants factors of building security within the built environment, as a result of little or inadequate literature availability with respect to the subject matter. The target population considered for the quantitative strand were the built environment experts *(contractors, consultants and clients' representatives)* within the built environment. The quantitative strand employed convenience sampling to source data from respondent. The adoption of this sampling technique was as a result accessibility and proximity of the samples.

Data collection

Interviews conducted involve semi-structured open-ended questions. This was to determine factors affecting building security cost in Nigerian urban environment. Semi-structured interviews allowed participants (for instance, interviewees) to discuss and pen down their interpretations of the world in which they live in and articulate how they regard situations in their opinions (Cohen *et al*., 2011). The quantitative strand employed questionnaire survey for data collection. It is necessary at sampling technique stage to adopt a sampling process that is appropriate for the target population. Therefore, convenience sampling was employed to determine potential and relevant respondents who were experts in the construction industry. The sample comprised of Architects, Builders, Quantity Surveyors, Urban and Regional Planners, and Estate Surveyors and Valuers. Thus, the respondents were required to rank the established factors identified from the qualitative strand on a Likert scale 1-5, the extent to which the factors in their views and experiences influence the building security cost. To produce a reliable and convincing results, a typical survey requires a minimum response rate of 30% with a sample size larger than 30 are recommended for most research studies (Ali *et al*., 2010). Therefore, a total number of 50 questionnaires were distributed to construction experts aforementioned while 41 questionnaires were returned and found useful and valid for the analysis at 82% response rate.

Data analysis and discussion

Demography of respondents

Table 2 presents the profile of the respondents on open ended and written comment format to explore the factors affecting the cost of building security within the built environment. The table shows that the interviewed respondents have significant expertise within the built environment ranging from 10 years to 25 years. The overall professional experience of the ten respondents is averaged at 17.1 years. The respondents were senior employees in their respective organisations and holding executive and managerial positions. Thus, it can be concluded that the respondents have relevant experience and technical background on the subject matter.

Table 2: Profile of the respondents interviewed for exploration of factors

No	Organisation	Professional qualification	Designation	Experience (years)
1	Consultant	Architect	Principal Consultant	21
2	Consultant	Architect	Project Architect	15
3	Contractor	Building Engineer	Managing Director	17
4	Contractor	Building Engineer	Project Manager	10
5	Developer	Estate Surveyor and valuers	Managing director	17
6	Developer	Estate Surveyor and valuers	Managing Director	10
7	Consultant	Quantity Surveyor	Principal Consultant	18
8	Consultant	Quantity Surveyor	Principal Consultant	22
9	Consultant	Urban and regional Planner	Principal consultant	25
10	Consultant	Urban and regional Planner	Principal Officer	16

Descriptive analysis of text (Interview) data

This section presents the analysis carried out to further answer the first research question. To establish and rank the determinant factors of building security cost within the built environment in Nigeria. The ranking of factors was achieved through the use of descriptive analysis (frequency and percentage). Frequency and ranks of factors influencing building security cost within built environment in Nigeria are presented in Table 3.

Table 3: Compilation of the Responses

Factors	1	2	3	4	5	6	7	8	9	10	Frequency
Access Prevention	x	x	x	x		x	x	x	x	x	9
Intruder Detection		x	x	x		x	x		x	x	7
Perimeter Fence Protection and Security house	x	x	x		x	x	x	x	x	x	9
Security Lighting					x		x			x	3
Location of building					x	x		x	x	x	5
Height of building	x	x		x	x	x	x	x			7
Size of building	x	x		x	x	x					5
Use of building		x	x				x	x		x	5
External wall openings				x			x	x		x	4
Plan shape	x	x									2
Aesthetics							x	x		x	3

Key

Professionals	Code
Architects	1&2
Builders	3&4
Estate Surveyors and Valuers	5&6
Quantity Surveyors	7&8
Urban and Regional Planners	9&10

Access prevention, perimeter fence protection and security house were ranked the highest with a total of 9 responses which is 15%. However, previous studies have shown that buildings fortified with security components were highly restricted, which resulted in relatively high costs of building security as well as general price of homes (Vollaard & van Ours, 2011). Likewise, Fischer *et al*. (2008) identified the grounds around the building as the first among other four line of protection of physical security planning. Erection of perimeter fence and protection serves to control or restrict access to unauthorized persons. Thus, this result is in accordance with routine activity theory (RAT) principle of crime prevention (Delice, 2011). However, the costs of constructing the perimeter fence and protection will positively influence the cost of building security.

Intruder detection and height of building were ranked second on the table of ranking with a total of 7 responses at 12%. This outcome also signified a high level of importance of this factor in relation to building security cost. The installation of modern security gadgets such as burglar alarms, intruder detectors coupled with surveillance cameras also help in prevention of crime (Jackson, 2009; Morgan *et al*., 2012). Similarly, it is evidenced from the research conducted by Ali *et al.*, 2010; Blackman and Picken, 2010 which showed a similar relationship between height and cost of doors and windows.

Location and size of building were ranked third on the table of ranking with a total of 5 responses at 9%. This is an indication that the location of building is among the most influential factor affecting building security cost. The outcome is in line with the research conducted by Cozens (2009). Also, supported by the study carried out by Cunningham (2013) which indicated variation in costs of building security with respect to locations. Similarly, the size of building has been identified as a factor among several factors that defined building cost through a previous study conducted by Mac-Barango (2012). Although, Ibrahim *et al*. (2007) established that the larger buildings have lower unit costs per square meter of gross floor area than smaller sized buildings offering an equivalent quality of specification which resulted in an inverse relationship between size and the cost per square metre.

Table 4 presents the demographical information of the respondents' survey. The frequency and percentage of the respondents job title or discipline, age and level of education. The characteristics of the respondents that participated in the survey are summarised in Table 4.

Table 4: Demographical Information of the Respondents' Survey

Parameters	Frequency	%age	Cumulative%
Job Title			
Consultant (Arch)	8	19.5	19.5
Contractor (Builders)	8	19.5	39.0
Consultant (QS)	14	34.1	73.2
Consultant/Civil Servant (URP)	6	14.6	87.8
Consultant (ES&V)	5	12.2	100.0
Age			
30-40	17	41.5	41.5
41-45	12	29.3	70.7
46-50	7	17.1	87.8
More than 50	5	12.2	100.0
Level of Education			
Bachelor	15	36.6	36.6
Master	26	63.4	100.0
PhD	0	0.0	100.0

Kruskal-Wallis Test

This section presents the analysis carried out to answer the second research question. Its purpose is to determine the level of importance of the established cost-influencing factors on building security cost within the built environment in Nigeria. This objective was achieved through the use of Kruskal-Wallis Test. Thus, the output of measurement consists of a Chi-Square value, the degrees of freedom (df) and the significance level (Asymp. Sig.). According to Pallant (2011), if the significance level is less than 0.05 then there is a statistically significant difference in the continuous variables across the groups. Thus, the Mean Rank of the variables and the groups can be checked in the output. Table 5 shows the results of the Kruskal-Wallis Test which displays the Chi-Square, degree of freedom and the significance level for all factors affecting building security cost within the built-environment in Nigeria. The values of all factors, as indicated in the Table 4, are greater than 0.05 level of significance recommended (Pallant, 2011), except for 'intruder detection' that has a value of 0.015 significance level. The result of Kruskal-Wallis Test reveals statistically that a non-significant difference existed in the levels of importance across all the factors, except for the factor of intruder detection. This is an indication that all factors are important although the respondents have varying perceptions towards intruder detection. The result is shown in Table 5.

Table 5: Kruskal-wallis test statistics of factors influencing building security cost

	Pshape	Size	Height	Use	ExWop	Loc	Aest	Accprev	Intdet	Permfpg	SecLight
Chi-Square	3.096	1.970	3.617	4.090	6.110	.670	8.314	5.526	12.391	5.528	6.548
Df	4	4	4	4	4	4	4	4	4	4	4
Asymp. Sig.	.542	.741	.460	.394	.191	.955	.081	.237	.015	.237	.162

a. Kruskal-Wallis Test; b. Grouping Variable: Discipline.

Table 6 presents the respondents' perceptions on each of the factors influencing building security cost within the built-environment. It revealed the mean ranks of all factors influencing building security cost.

Table 6: Ranks of the factors influencing building security cost

Job Title		Plan Shape	Size	Height	Use	Ext Wal open	Loc	Aest	AccPrv	IntDet	Per FPSh	Seclight
	N	Mean Rank	Mean Rank	Mean Rank	Mean Rank	Mean Rank	Mean Rank	Mean Rank	Mean Rank	Mean Rank	Mean Rank	Mean Rank
Arch	8	21.81	22.00	26.75	23.56	20.56	21.63	15.88	22.75	26.50	17.06	16.13
Builder	8	26.00	23.44	20.56	17.69	27.19	22.38	25.38	24.50	26.50	27.25	26.19
QS	14	20.57	20.86	20.93	24.43	16.54	21.29	25.29	19.07	19.54	22.25	23.89
URP	6	15.58	15.92	15.92	16.75	19.00	19.83	19.50	14.00	11.67	19.50	20.50
Estate	5	19.40	22.00	18.80	17.70	26.70	18.40	12.00	26.40	18.70	15.60	13.00

The mean ranks of all factors revealed that, Architects rank height of building and intruder detection high with a mean ranks values of 26.75 and 26.50 respectively. Builders' rank external wall openings and perimeter fence protection and security house higher with the mean ranks values of 27.19 and 27.25 respectively. Also, intruder detection and security light are among the factors ranked high by the builders with mean ranks values of

26.50 and 26.19 respectively. Quantity Surveyors rank use of building and aesthetics higher with the mean rank values of 24.43 and 25.29 respectively. Also, Urban and Regional Planners rank location of building and aesthetics high with the mean ranks values of 19.83 and 19.50 respectively. Finally, Estate Surveyors rank external wall openings and access prevention high with the mean rank values of 26.70 and 26.40 respectively. Thus, the implication of these results is that the choice of protective security measures should not be based on a particular professional perception. These results have shown that the priority of each professional varies across the table of ranking vary. However, the collections of all the top ranked influencing factors should be harmonised and given optimal consideration while introducing protective security measures in a building.

Table 7 presents the respondents' perception of factors influencing building security cost within the built-environment. The ranking of the professionals in the highest order: Builders, Quantity Surveyors, Architects, Estate Surveyors and Valuers, Urban and Regional Planners are shown in Table 7.

Table 7: Respondents perception on factors influencing building security cost

Job Title	Total Mean Score	Average Mean Score	Rank
Architects	234.63	21.33	3
Builders	267.08	24.28	1
Quantity Surveyors	234.66	21.33	2
Urban and Regional Planners	188.17	17.11	5
Estate Surveyors and Valuers	208.70	18.97	4

Table 8 presents the level of importance of the factors influencing building security cost within the built-environment in Nigeria. The Kruskal-Wallis Test revealed non-statistically significant difference across all the factors except for 'Intruder Detection' based on 0.05 significant level as mentioned earlier. However, this study explores the overall perception of the respondents to rank each factor influencing building security cost within the built-environment in Nigeria.

Table 8: Overall ranking of factors influencing building security cost

Factors	Total Mean Score	Average Mean Score	Rank
External Wall opening	109.99	21.99	1
Access Prevention	106.72	21.34	2
Size of Building	104.22	20.84	3
Location of Building	103.53	20.71	4
Plan Shape	103.36	20.67	5
Height of Building	102.96	20.59	6
Intruder Detection	102.91	20.58	7
Perimeter Fence Protection and Security House	101.66	20.33	8
Use of Building	100.13	20.03	9
Security light	99.71	19.94	10
Aesthetics	98.05	19.61	11

The following are the discussion of the overall ranking of the factors influencing building security cost, determined from Table 8.

External wall opening came first on the list of ranking with a total mean value of 109.99. Thus, the building openings increase the cost of securing a building. Fischer *et al.* (2008) affirmed that second line of defence is the aspect of securing building's perimeter that incorporated all openings such as doors and windows. Consequently, unsecured openings in a building allow the burglars opportunity and accessibility to select and burgle the building (Delice, 2011).

Access Prevention was ranked second with a total mean value of 106.72. However, previous study has shown that buildings fortified with security components was highly restricted, which resulted in relatively high costs of building security as well as general price of homes (Vollaard and van Ours, 2011).

S*ize of Building* was the third-ranked factor affecting building security costs with a total mean score of 104.22. The size of building has been identified as a factor among several factors that defined building cost through a previous study conducted (Mac-Barango, 2012). Although, Ibrahim *et al.* (2007) established that the larger buildings have lower unit costs per square metre of Gross Floor Area (GFA) than smaller sized buildings offering an equivalent quality of specification which resulted ino an inverse relationship between size and the cost per square metre of (GFA).

Location of Building was ranked fourth on the table of classification with a total mean score of 103.53. An indication that the location of building is among the most influential factor affecting building security cost. The outcome is in line with the research conducted by Cozens (2009). Also, supported by the study conducted by Cunningham (2013) which showed variation in costs of building security with respect to locations.

Plan Shape was ranked fifth on the table of ranking with a mean total score of 103.36. However, several studies confirmed the relationship between plan shape and building cost (Zima and Plebankiewicz, 2012: Belniak *et al*., 2013). Therefore, it is an assertion that anything that affects doors and windows will affect burglar-proof to doors and windows. Also, other security gadgets that might need to be installed on them, such as; glass break detector, sensor alarm, CCTV, burglar alarm system.

Height of Building had a total mean score of 102.96 which makes it the sixth most influential factor affecting building security cost. The research conducted by Ali *etal.* (2010) and Blackman and Picken (2010) which showed similar relationship between height and cost of doors and windows. Also, previous studies revealed the existence of a linear relationship between height and cost, which was reduced to cost/m^2 of gross floor area against the number of the storey (Ibrahim *etal*., 2007; Blackman and Picken 2010).

Intruder Detection was ranked seventh on the table of classification with a mean total score of 102.91. This outcome also signifies a high level of importance of this factor in relation to building security cost though respondents had a different perception of the factor. The installation of modern security gadgets such as burglar alarms, intruder detectors coupled with surveillance cameras also helps in prevention of crime (Lee, 2008; Morgan *et al*., 2012).

Perimeter Fence and Protection had a mean total score of 101.66 and ranked eighth on the list. Fischer *et al.* (2008) identified the grounds around the building as the first among other four line of protection of physical security planning. Thus, erection of perimeter fence and protection serves to control or restrict access to unauthorized persons. Thus, this result in accordance with RAT principle of crime prevention (Delice, 2011). However, the costs of constructing the perimeter fence and protection will positively influence the cost of building security.

Use of Building was ranked ninth in the group of factors affecting building security cost with a mean total score of 100.13. According to Cunningham (2013), use of building whether for residential, commercial or any other use a building is subjected to, often determines the magnitude of investment into building security.

Security Lighting was the tenth on the ranking list with a total mean score of 99.71 showing the effects of this factor on building security costs. Security lighting is one of the many strategies of crime prevention principles recommended by Delice (2011), to be adopted in order to avoid being a victim of crime. However, deflecting offender with the aid of security lighting is in line with the RAT principle (Delice, 2011).

Aesthetics was the least on the ranking with a total mean score of 98.05. According to Oberle *et al*. (2007), it is important to evaluate the security requirement of each building at different levels of the project. As this will ensure a balance between security requirement and other aspects of the building, such as architectural expression (for instance, aesthetics) of the buildings (Delice, 2011). Thus, balancing every aspects of building with one and other without compromising one for another will affect the building cost.

Conclusion

The study employed the Kruskal-Wallis Test to validate the views of the respondents from the interviews conducted and ranked the items

accordingly. The result revealed a not statistically significant difference in the perceptions of the respondents toward building security costs. The top three ranked respondents were Builders, Quantity Surveyors and Architects with the mean total score of 267.08, 234.66 and 234.63 respectively. Thus, all items identified are significant and having impact on building security costs. Also, there were no significant variations among the items. Furthermore, the results showed the ranks between the first and the least items on the table of classification ranging between 109.99 and 98.05 in a descending order. An indication that all items identified are determinants of building security cost within the built environment. The evaluation of the respondents' perception was based on the criterion of a value greater than 0.05 level of significance recommended. Thus, this study concluded based on respondents' perceptions that the established cost-influencing factors aforementioned are key determinants of building security costs within the built environment. It further provided relevant information for determining the relationship between the items and building security cost as well as the effect size of each item on building security cost. The findings provided a new understanding of the factors that constituted and influenced the cost of building security within the built environment. Further implication of this study is that it will sensitize the built environment experts, criminologists and policy makers of the significance and impact of the established factors on building security costs. Finally, the study will lead to an improvement for efficiently evaluating, controlling as well as forecasting of the probable future costs of building security.

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