VOL. 10, NO. 16, SEPTEMBER 2015 ISSN 1819-6608
ARPN Journal of Engineering and Applied Sciences

www.arpnjournals.com

ASSESSMENT OF BUILDING SECURITY COST DETERMINANTS EFFECTS

Anifowose Opeyemi Maroof[1], Ilias Said[2] and Radzi Ismail[3]
[1]Department of Quantity Surveying SET, Federal University of Technology, Minna, Nigeria
[1,2,3]Department of Construction Management, HBP, Universiti Sains Malaysia, Pinang, Malaysia
E-Mail: anny4yemi2000@yahoo.com

ABSTRACT

This study explores and assesses the effects of the cost factors of building security cost within the built-environment, using mixed methods sequential exploratory research design. Result of severity index (SI) analysis revealed no significant gap exist between the factors with SI values ranges from 94% to 72%. The result of descriptive analysis was at *effective effect* for security measures, whereas building characteristics was at *moderate effect*. Likewise, ANOVA result for security measures was at *large effect* while building characteristics was at *medium effect*. The interaction effect result show that the magnitude of the interactive effects between Security Measures and Building Characteristics on the Building Security cost was statistically significant. Therefore, the cost-influencing factors of building security were found to be: security measures and building characteristics. They had substantial effect on building security cost based on the findings in this study. However, this study will lead to further investigation into the relationship that exist between security measures, building characteristics and building security cost within the built-environment.

Keywords: security measures, building characteristics, building security cost, effect, severity index, sequential exploratory design.

INTRODUCTION

The impact of burglary upon victims is significant, and includes considerable psychological costs in addition to the financial costs of replacements and repairs. In response, many households have adopted security measures of various types (Tseloni, Thompson, Grove, Tilley, and Farrell, 2014). Security related costs arise from security design principles applied to newly constructed buildings and modification of government structures (Smith and Bryant, 2010). In United Kingdom, installation of protective devices for securing life and properties within household is at the discretion of individual (Tseloni *et al*., 2014). The situational crime prevention is a strategy to identify, manipulate and control the situational, environmental or characteristics of building related to particular types of crime such as burglary (Clarke, 1997; Morgan, Boxall, Lindeman, and Anderson, 2012). However, the concern of situational prevention is on the premise that crime is frequently opportunistic and aims to modify contextual factors to limit the opportunities for offenders that involves in criminal activities (Morgan *et al.*, 2012). Studies conducted in Australia and overseas have shown the effectiveness of situational crime prevention in reducing crime in circumstances. An evaluation of the UK reducing residential burglary initiative have shown that investment in situational prevention rather than offender-focused prevention have generally successful in reducing residential burglary (Hope *et al.*, 2004). It is evident that situational crime prevention provides sufficient strategy in crime reduction but there is lack of sufficient evidence to determine the most cost-effective approach in modifying environmental conditions to prevent crime (Morgan *et al.*, 2012). However, the empirical relationship between the factors constituting and factors influencing the cost of building security within the built-environment have yet to be established. This lack of knowledge has led to the exploration and assessment of the effects of cost factors on building security cost.

METHODOLOGY

This study employed sequential exploratory research design; a two phase mixed methods research design. Its two phase approach makes it applicability simple and straightforward to describe and report. 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 qualitative phase of this study was in two sections: first section of the text data involves purposefully selected sampling of 10 participants in line with Onwuegbuzie and Leech (2007) recommendations of ≤ 10 or ≥ 6 interviewers, from five different disciplines. To cover built environment professionals, namely: Architects, Builders, Quantity Surveyors, Urban and Regional Planners, and Estate Surveyors and Valuers. The selection was based on their involvement with housing within the built environment. Second section of the Numeric data involves simple random sampling. Thus, a total number of 50 questionnaires were administered to construction experts aforementioned, while 41 questionnaires were returned and found useful and valid for the analysis at 82% response rate. The phase two of this study employed quantitative research technique to source data primarily from the respondents. Sekaran (2006), stated that questionnaire is an efficient data collection instrument

when the researcher knows what exactly he needs and how to measure it. In addition, questionnaire is described as an excellent technique for collecting clear, accessible, informative, and brief data, to answer research questions and to support or reject hypotheses (Asfaw, 2006). Therefore, a total of 333 questionnaires were distributed for the purpose of this study. The sample was stratified into five stratums to cover built environment professionals mentioned above. However, out of 333 questionnaires administered in this study, 300 were returned, and only 293 were usable, resulting to 88% response rate. This response could be regarded as better and acceptable one when compared with the previous studies conducted in Nigeria, by Idoro (2010), and Musa, Oyebisi, and Babalola (2010), with 88% and 80% response rate respectively. Based on these, the 88% response rate achieved in this study is very good and acceptable. In order to validate the instrument used for this study, some of the lecturers who are also experts in various professions within the built environment that are familiar with the construction industry activities were contacted to check the clarity of the instrument used for this study. The reliability and normality of the instrument were tested using Cronbach's alpha, Skewness and kurtosis respectively.

Data collection and analysis

The qualitative data collection method was in two sections: the first section involves the use of open-ended questionnaires, while the second section used close-ended questionnaires to advance on the initial first section primary data collected. However, the themes for this research were identified through five (5) stage process in line with the previous researchers. The steps are as follows: becoming familiar with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes. Through this process, the final themes captured all factors of building security cost and presented some level of patterned response or meaning (Kabilan, 2013), for factors affecting building security cost within the built-environment. Table-1 presents the categories that were identified to sort responses to the questions.

Table-1. Categories identified to sort responses to the questions.

Questions	Categories
i) What factors constitutes the cost of building security in urban environment.	(a) Access prevention (i.e., security doors, burglary proof to doors and windows, mechanical locks, electronic locks), (b) Intruder detection (Burglar alarm system, glass break detection, sensor light, CCTV, complete camera with wifi application), (c) Perimeter fence, (d) perimeter protection, (e) Gate-house, (f) Security lighting
ii) What factors of building influences cost of building security in urban environment.	(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

Section two of this qualitative research questions were developed based on the classification of the responses to the questions in Table-1 above. This involved close-ended questions to source for primary data. The questionnaire was developed in order to determine the relative importance index of the identified factors, while item (c, d, e, and f) under the first question were merged as one item or factor. The descriptions of factors of building security cost are present Table-2.

ARPN Journal of Engineering and Applied Sciences

Table-2. Description of relevant factors emerged from the data.

Themes/Factors	Brief comments
Access prevention	Range of strategies that are implemented by individuals to target the various social and environmental factors that increases the risk of crime disorder and victimization.
Intruder detection	System that is designed to detect an unauthorized entry into a building or the entire premises.
Perimeter fence protection and security-house	Physical security barrier to provide a meaningful protection to the dwelling of the house and to serve as an obstacle to the movement of persons, as well as shelter for security equipment and guard in charge of monitoring and controlling of the equipment.
Security lighting	Security lighting is designed to deter the perpetrators, discourage criminal activities and to provide illumination for easy surveillance.
Location	Locational variation in the cost of security components.
Height of building	Bungalow building form or storey building form.
Size of building	Physical magnitude of total accommodation provided by the building.
Use of building	Different uses as in residential, commercial or other types of building uses.
Aesthetics	Attractiveness of building/client taste.
Plan shape	Irregular and complexity in the design.
External wall openings	External walls comprises of variety of openings that need to be secure.

In addition, statistical and mathematical analysis of 'text' was conducted to determine the degree of impact of each factor, using severity index (SI) analysis. Severity index analysis is one among the four techniques recommended by (Crane, 2010; Taylor-Powell and Renner, 2003), for identifying patterns and connections within and between categories. Thus, assessing the relative importance of different themes or highlighting the variables in this study is very important. In order to determine which categories appear more important: frequency, mean, standard deviation were conducted on the data, while severity index (SI), was adopted to rank the cost factors. The analysis was conducted using Microsoft office excel to work out the formula given by (Shash, 1993). Idrus and Newman (2002), Elhag, Boussabaine, and Ballal (2005), Chan (2012), Olawale and Sun (2012), Abdul Rahman, Memon, Karim, and Tarmizi (2013), and Cheng (2014) used the same approach in their various studies. Furthermore, the study employed descriptive statistics where by the mean values obtained were scale on the following effective level to realize the degree of the effect: 1.0 - 1.99 = no effect, 2.0 – 2.99 = minor effect, 3.0 - 3.99 = moderate effect, 4.0 - 4.99 = effective, and 5.0 = very effective. Likewise, the between-groups and between-subject ANOVA used F-value and its significant level to determine if there is a main effect or interaction effect on building security cost determinants factors. Thus, if the main effect is significant then it's further subjected to effect size assessment so as to reveals the influence using partial eta squared outcome. The guideline proposed by (Cohen, 1988) are as follows: 0.01 = small effect, 0.06 = moderate effect, and 0.14 = large effect. Severity Index (SI) Formula is presented in equation below:

$$S.I = \left\{\sum_{i=1}^{i=n} w_i f_i\right\} x \frac{100\%}{n} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Figure-5.1: Severity Index Formula

$$wi = \frac{i}{A} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where i represents the ratings 1-5, f_i is the frequency of responses, n is the total number of responses and w_i is the weight for each rating (= rating in scale/number of points in a scale): where A is the highest score (i.e., 1-5 in this study). The ranking of the factors were presented under the qualitative results.

Severity index analysis results

The study employed both mean score and severity index (SI), to establish the degree of the impacts of the variables (i.e., security measures) on the building security cost as shown in Table-3. The mean score ranging between 1 and 5, (with 1 - not impacting at all to 5 - impacting a great deal) was adopted to rank the variables of factors affecting building security cost in urban environment.

Table-3. Severity index analysis of factors influencing building security cost.

Rank	Security factors	Mean (n=41)	SD	Severity index%
1	Intruder Detection	4.68	0.567	94
2	Location of Building	4.61	0.666	92
3	Use of Building	4.37	0.888	87
4	Access Prevention	4.27	0.672	85
5	External Wall Openings	4.12	0.899	82
6	Perimeter Fence and Protection	4.11	0.819	82
7	Height of Building	4.10	0.831	82
8	Security Lighting	3.95	0.921	79
9	Size of Building	3.90	0.735	78
10	Plan Shape	3.76	0.943	75
11	Aesthetics	3.59	0.999	72
Note: SD = Standard Deviation				

However, Intruder Detection ranked the highest with mean value of 4.68 and severity index (S.I value of 94%) which signified a high degree of impact and the level of importance of this factor in relation to building security cost. The installation of modern security gadgets such as burglar alarms, intruder detectors couples with surveillance cameras also helps in prevention of crime (Ceccato and Lukyte, 2011).

However, location of building was ranked second on the list of ranking with both mean value of 4.61 and S.I value of 92%. This is an indication that location of building is also an influential factor affecting building security cost, consistent with the research conducted by (Cozens, Saville, and Hillier, 2005; Skitmore, Runeson, and Chang, 2006).

Use of building was ranked third in the group of factors affecting building security cost with mean value of 4.37 and S.I value of 87%. According to (Anifowose, 2011), use of building often determine the magnitude of investment into building security.

Access Prevention was ranked fourth with the mean value of 4.27 and S.I value of 85%. However, an evidence from a natural experiment on the regulation of built-in security components carried out by (Vollaard and van Ours, 2011) have shown that buildings fortified with security components were highly restricted, which resulted in relatively high increase in costs of building security as well as general price of home.

External wall opening came fifth on the list of ranking with mean value of 4.12 and S.I value of 82%. Thus, the building openings increase the cost of securing a building. According to Fischer, Halibozek, and Green (2008), securing building's perimeter that incorporated all the openings for doors and windows is referred to as second line of defence. Consequently, unsecure openings in a building afford the burglars opportunity and accessibility to select and burgle the building (Delice, 2011).

Perimeter Fence and Protection was the sixth on the list of ranking with mean value of 4.11 and S.I value of 82% and ranked third on the table of ranking. Fischer *et al.* (2008), identified the grounds around the building as the first line of protection of Physical security planning. Thus, erection of perimeter fence and protection serves to control or restrict access to unauthorized persons.

Height of building was the seventh on the list of ranking with mean value of 4.10 and S.I value of 82%, study conducted by Blackman and Picken (2010) revealed the existence of relationship between height and cost of doors and windows.

Security Lighting was the eighth on the list of ranking with mean value of 3.95 and S.I value of 79% showing the impacts or effects of this variable or factor on building security cost. security light were among several crime prevention principle recommended by (Delice, 2011; Fattah, 1999), to be adopted in other to avoid being a victim of crime.

Size of Building was the 9th ranked factor affecting building security cost with the mean value of 3.90 and S.I value of 78%. Size of building had been identified as a factor among several factors that defined building cost through previous study conducted by (Mac-Barango, 2012).

Plan Shape was ranked 10th on the list of ranking with mean value of 3.76 and S.I value of 75%. However, several studies confirmed the relationship between plan shape and building cost, example of such is study conducted by (Belniak, Lesniak, Plebankiewicz, and Zima, 2013).

Aesthetics was the least on the table of ranking with mean value of 3.59 and S.I value of 72%. According to Oberle, Pohlman, and Roper (2007), it is important to

evaluate the security requirement of each type of building and at different level of the project, as this will ensure balance between security requirement and other aspects of the building such as architectural expression (e.g., aesthetics) of the buildings.

Descriptive statistic, one-way between-groups and between-subject two-way ANOVA results

This section presents the analysis carried out to answer the current research question. Its objective was to ascertain the magnitude of effect of the established factors on building security cost within built environment in Nigeria. To achieve this objective, the study employed descriptive statistics where by the mean values obtained were categorised on a five Likert scale of effective level in order to realize the degree of the effect: 1.0 - 1.99 = no effect, 2.0 - 2.99 = minor effect, 3.0 - 3.99 = moderate effect, 4.0 - 4.99 = effective, and 5.0 = very effective. Likewise, the between-groups and between-subject ANOVA used F-value and its significant level to determine if there is a main effect or interaction effect on building security cost determinants factors. Thus, if the main effect is significant then it's further subjected to effect size assessment so as to reveals the influence using partial eta squared outcome. The guideline proposed by (Cohen, 1988) are as follows: 0.01 = small effect, 0.06 = moderate effect, and 0.14 = large effect. However, the results of this analysis were presented as follows:

Table-4. Magnitude of building security cost determinant: Security measures.

	Access prevention			Intruder detection			Fence protection and sec-house			Security lighting		
Effect level	**Freq**	**Percent**	**Mean**	**Freq**	**Percent**	**Mean**	**Freq**	**Percent**	**Mean**	**Freq**	**Percent**	**Mean**
1-No effect	--	--		--	--		--	--		--	--	
2-Minor effect	--	--		--	--		--	--		--	--	
3-Moderate effect	72	24.6		32	10.9		81	27.6		98	33.4	
4-Effective	197	67.2	4.22	221	75.4	4.30	196	66.9	4.17	138	47.1	4.22
5-Very effective	24	8.2		40	13.7		16	5.5		57	19.5	

Table-4 presents the frequency, percentage and mean scores for the magnitude of cost-influencing factor *Security Measure:* Access prevention, Intruder detection, Perimeter fence protection and sec-house, and security lighting on Building Security Cost in urban environment in Nigeria. For all of the four security measure factors, the effective scores the highest across the four factors with the frequency ranged between 221 (75.4%) for Intruder detection and 138 (47.1%) for security lighting. The mean scores for the four factors ranged between 4.30 and 4.17, these results shows that the magnitude of determining factors of building security cost is at the level of *effective effect.*

Table-5. One-way between-groups ANOVA; Effect size.

Variables	F	Sig.	Eta squared	Remark
Access prevention	10.657	0.000	0.068	Medium Effect
Intruder detection	36.606	0.000	0.201	Large Effect
Perimeter fence protection and sec-house	66.847	0.000	0.315	Large Effect
Security light	53.970	0.000	0.271	Large Effect
Security measures	79.456	0.000	0.353	Large Effect

Table-5 presents the inclusive effects of security measure, as well as the individual effects of variable on Building security cost based on significant value. The combined factors; security measures was at 0.000 significant level with F-value of 79.456. Since, the significant level is less than 0.05. Therefore, security measures had significant main effect on Building security cost. At individual level of the variables, all variables were significant at 0.000 with the p-values ranged between 10.657 for Access prevention and 66.847 for Perimeter Fence Protection and Sec-house. Similarly, the significant level for individual variable is less than 0.05. Therefore, Access prevention, Intruder detection, Perimeter Fence

Protection and Sec-house and security lighting had significant main effect on Building security cost.

Table-6. Magnitude of building security cost determinant: Building characteristics.

	Location of building			Height of building			Size of building			Use of building		
Effect level	**Freq**	**Percent**	**Mean**	**Freq**	**Percent**	**Mean**	**Freq**	**Percent**	**Mean**	**Freq**	**Percent**	**Mean**
1-No effect	--	--		--	--		--	--		--	--	
2-Minor effect	--	--		24	8.2		8	2.7		--	--	
3-Moderate effect	113	38.6		155	52.9	3.86	129	44.1	3.92	24	8.2	
4-Effective	164	55.9	4.10	114	38.9		148	50.5		245	83.6	4.26
5-Very effective	16	5.5		--	--		8	2.7		24	8.2	
	External wall openings			**Plan shape**			**Aesthetics**					
Effect level	**Freq**	**Percent**	**Mean**	**Freq**	**Percent**	**Mean**	**Freq**	**Percent**	**Mean**	**Freq**	**Percent**	**Mean**
1-No effect	--	--		--	--		--	--				
2-Minor effect	129	44.0		--	--		--	--				
3-Moderate effect	147	50.2		91	31.1		120	41.0				
4-Effective	17	5.8	4.06	193	65.8	4.14	157	53.5	4.10			
5-Very effective	--	--		9	3.1		16	5.5				

Table-6 presents the frequency, percentage and mean scores for the magnitude of cost-influencing factor *Building Characteristics:* Location of building, Height of building, Size of building, Use of building, External wall openings, Plan shape, and Aesthetics, on Building Security Cost in urban environment in Nigeria. Five factors of building characteristics were at the affective level. The effective scores the highest across the Location of building with 164 (55.9%), Size of building with 148 (50.9%), Use of building with 148 (50.5%), Plan shape with 193 (65.8%), and Aesthetics with 157 (53.5%). The mean scores for all the seven factors ranged between 4.26 and 3.86. External wall openings had frequency of 147 (50.2%) high at moderate level and join the group of Location of building, Use of building, Plan shape and Aesthetics at effective level with the mean score of 4.06. These five factors shows that the magnitude of determining factor among the experts/professionals in Nigeria is at the level of *effective effect* with mean scores ranging from 4.26 to 4.06, while the remaining two factors Height and Size of building were at the level of *moderate effect* with the mean scores of 3.86 and 3.92 respectively.

Table-6. One-way between-groups ANOVA; Effect size.

Variables	**F**	**Sig.**	**Eta Squared**	**Remark**
Location of Building	61.166	0.000	0.296	Large Effect
Height of Building	17.553	0.000	0.107	Medium Effect
Size of Building	18.455	0.000	0.112	Medium Effect
Use of Building	25.577	0.000	0.149	Large Effect
External Wall Openings	20.920	0.000	0.126	Medium Effect
Plan Shape	24.390	0.000	0.143	Large Effect
Aesthetics	83.265	0.000	0.364	Large Effect
Building Characteristics	21.270	0.000	0.127	Medium Effect

Table-7 presents the inclusive effects of Building Characteristics, as well as the effects of individual variable on Building security cost based on significant value. The combined factors; building characteristics was at 0.000 significant level with F-value of 21.270. Since, the significant level is less than 0.05. Therefore, building characteristics have significant main effect on Building security cost. At individual level of the variables, all variables were significant at 0.000 with the p-values ranged from 17.553 to 83.265. Aesthetics, Location, Use of building, and Plan shape were at large effect level with P-values of 83.265, 61.166, 25.557, and 24.390

respectively, while External wall openings, Size of building, and Height of building were at medium effect level with the P-values of 20.920, 18.455, and 17.553 respectively. Similarly, the significant level for individual variable is less than 0.05. Therefore, Location, Height, Size, Use, External wall openings, Plan shape and Aesthetics, have significant main effect on Building security cost.

Table-8. Test of between-subject ANOVA; Interactive effect.

Variables	F	Sig.	Eta Squared	Remark
Security measures vs. Building characteristics	33.001	0.000	0.103	Medium Effect

Table-8 presents the interaction effect between Security Measures and Building Characteristics on the Building Security cost based on significant value. Therefore, the main construct interaction effect between Security Measures and Building Characteristics was statistically significant at 0.000, with F-value = 33.001. Since the significant value is less than 0.05, the result indicate that the interaction between Security Measures and Building Characteristics have significant effect on Building Security Cost in urban environment in Nigeria.

DISCUSSIONS

The descriptive analysis of effect level for all the factors examined under *security measures*: access prevention, intruder detection, perimeter fence protection and security-house, and security lighting, depicts an *effective effect* level. This is an indication that the degree of the effect of security measures is strong enough to be given due consideration in the assessment of factors influencing building security cost within the built-environment. The descriptive analysis result for *building characteristics* was at effective level for five factors to include: location of building, use of building, plan shape, aesthetics and external wall openings. The remaining two factors of building characteristics: height of building and size of building were at the level of *moderate effect.* This means the effect of building characteristics is reasonable and thus sufficient to influence the cost of building security within the built-environment.

The result of between-groups and between-subject ANOVA analysis of effects were conducted to further reveal the magnitude of the effect of the cost-influencing factors. This analysis involves the main effect (inclusive effect) and interactive effect. The main effect for security measures and building characteristics depicts significant effect on building security cost, although the effects varies in terms of its magnitude as the mean value in the descriptive analysis and the partial eta squared in the result of ANOVA. However, the main effect for security measures is at *large effect*, while building characteristics is at *medium effect*. This means the degree of the influence of the factors differs on building security cost, which is similar with the result observed in the descriptive analysis. This is an indication that building security cost is really affected by these factors. The interaction effect result shows that the magnitude of the interactive effects between Security Measures and Building Characteristics on the Building Security cost was statistically significant. The interactive effect is at medium effect. The result indicate that the interaction between Security Measures and Building Characteristics have significant effect on Building Security Cost. This means the factors have both independent and dependent effects on building security cost but at a varying magnitude as depicted in the descriptive analysis.

CONCLUSIONS

This paper explores the cost factors of building security cost as well as determining the effects of the cost factors on building security cost within the built-environment, using mixed methods sequential exploratory research design. Eleven factors were identified having direct relationship with building security cost. The result of severity index (SI) analysis conducted shows no significant gap between the cost factors with SI values ranges from 94% to 72%. An indication that the factors are having strong relationship with building security cost when compared with previous studies conducted by (Abdul Rahman *et al*., 2013; Ali, Kamaruzzaman, Sulaiman, and Peng, 2010; Cheng, 2014). Furthermore, with the effective and moderate effect results obtained in descriptive analysis, and large effect and medium effect results obtained in ANOVA. Therefore, the cost-influencing factors of building security were found to be: security measures (access prevention, intruder detection, perimeter fence protection and security-house, and security lighting) and building characteristics (location of building, height of building, size of building, use of building, external wall openings, plan shape and aesthetics), and they had substantial effect on building security cost based on the findings in this study. Therefore, this answer the research question regarding the magnitude effect of the cost-influencing factors of building security cost within the built-environment in Nigeria. However, the realisation of this objective will lead to investigation of relationship that exist between security measures, building characteristics and Building security cost within the built-environment.

REFERENCES

Abdul Rahman I., Memon A. H., Karim A. and Tarmizi A. 2013. Significant factors causing cost overruns in large

construction projects in Malaysia. Journal of Applied Science. 13(2): 286-293.

Ali A. S., Kamaruzzaman S. N., Sulaiman R. and Peng Y. C. 2010. Factors affecting housing maintenance cost in Malaysia. Journal of Facilities Management. 8(4): 285-298.

Anifowose O. M. 2011. 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. Journal of Building Performance. 2(1): 18-26.

Asfaw M. 2006. Information and communication technologies within Ethiopia:Socio-personal factors affecting adaptation and use: Phd, Walden university, US.

Belniak S., Lesniak A., Plebankiewicz E. and Zima K. 2013. The influence of the building shape on the costs of its construction. Journal of Financial Management of Property and Construction. 18(1): 90-102.

Blackman I. Q. and Picken D. H. 2010. Height and Construction Costs of Residential High-Rise Buildings in Shanghai. Journal of Construction Engineering and Management. 136(11): 1169-1180. doi: 10.1061/(ASCE)CO.1943-7862.0000226.

Ceccato V. and Lukyte N. 2011. Safety and sustainability in a city in transition: The case of Vilnius, Lithuania. Cities. 28(1): 83-94.

Chan C. T. 2012. The principal factors affecting construction project overhead expenses: an exploratory factor analysis approach. Construction Management and Economics. 30(10): 903-914.

Cheng Y.-M. 2014. An exploration into cost-influencing factors on construction projects. International Journal of Project Management. 32(5): 850-860.

Clarke R. V. 1997. Situational crime prevention: Criminal Justice Press.

Cohen J. 1988. Statistical power analysis for the behavioral sciences: Psychology Press.

Cozens P. M., Saville G. and Hillier D. 2005. Crime Prevention Through Environmental Design (CPTED): A Review and Modern Bibliography. Property Management. 23(5): 328-356.

Crane K. 2010. Analyzing qualitative data. ASTD Handbook for Measuring and Evaluating Training, 165.

Delice M. 2011. How the routine activity theory can help police understand and prevent burglary. Turkish Journal of Police Studies. 13(1): 137-154.

Elhag T., Boussabaine A. and Ballal T. 2005. Critical determinants of construction tendering costs: Quantity surveyors' standpoint. International Journal of Project Management. 23(7): 538-545.

Fattah E. A. 1999. Some reflections on crime prevention strategies in large metropolitan centers of the 21st century. European Journal of Crime, Criminal Law and Justice, 7, ss. 130-149.

Fischer R. J., Halibozek E. and Green G. 2008. Introduction to Security (8 ed.). Jordan Hill, Oxford, UK: Butterworth-Heinemann, Elsevier Inc.

Hope T., Bryan J., Crawley E., Crawley P., Russell N. and Trickett A. 2004. Strategic Development Projects in the Yorkshire and the Humber, East Midlands and Eastern Regions.

Idoro G. I. 2010. Evaluating the Content of Bar Chart and its Impact on Project Performance in the Nigerian Construction Industry. International journal of project planning and finance. 1(1): 84-101.

Idrus A. and Newman J. 2002. Construction related factors influencing the choice of concrete floor systems. Construction Management and Economics. 20(1): 13-19.

Kabilan M. K. 2013. A phenomenological study of an international teaching practicum: Pre-service teachers' experiences of professional development. Teaching and Teacher Education. 36, 198-209.

Mac-Barango D. O. 2012. An investigative study of the effect of design decisions on the cost of building. Paper presented at the Procs 4th West Africa Built Environment Research (WABER), Abuja, Nigeria.

Morgan A., Boxall H., Lindeman K. and Anderson J. 2012. Effective crime prevention interventions for implementation by local government. Australia: Australian Institute of Criminology.

Musa N. A., Oyebisi T. O. and Babalola M. O. 2010. A study of the impact of information and communications technology (ICT) on the quality of quantity surveying services in Nigeria. The Electronic Journal on Information Systems in Developing Countries. 42(7): 1-9.

Oberle R., Pohlman T. and Roper K. 2007. Balancing User Priorities for Sustainability versus Security. Journal of Architectural Engineering. 13(4): 180-186.

Olawale Y. and Sun M. 2012. PCIM: Project control and inhibiting-factors management model. Journal of Management in Engineering. 29(1): 60-70.

Onwuegbuzie A. J. and Leech N. L. 2007. A call for qualitative power analyses. Quality and Quantity. 41(1): 105-121.

Sekaran U. 2006. Research methods for business, A skill building approach (4 ed.). India: Wiley and Sons.

Shash A. A. 1993. Factors considered in tendering decisions by top UK contractors. Construction Management and Economics. 11(2): 111-118.

Skitmore M., Runeson G. and Chang X. 2006. Construction price formation: full - cost pricing or neoclassical microeconomic theory? Construction Management and Economics. 24(7): 773-783.

Smith J. L. and Bryant L. M. 2010, 23/07/2010. Cost Impact of the ISC Security Design Criteria. WBDG (Whole Building Design Guide). Retrieved 02/06/2013, 2013.

Taylor-Powell E. and Renner M. 2003. Analyzing Qualitative Data. Retrieved 25/7/14, 2014.

Tseloni A., Thompson R., Grove L., Tilley N. and Farrell G. 2014. The effectiveness of burglary security devices. Security Journal. doi: 10.1057/sj.2014.30.

Vollaard B. and van Ours J. C. 2011. Does Regulation of Built-in Security Reduce Crime? Evidence from a Natural Experiment. Economic Journal. 121(552): 485-504. doi: 10.1111/j.1468-0297.2011.02429.x.