

AN EXPLORATION INTO COST INFLUENCING FACTORS ON BUILDING SECURITY

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ABSTRACT

Security is increasingly having importance attached to it worldwide. The historical background of housing cannot be separated from criminal activities committed within houses which often follow a forceful entry by perpetrators. The objective of this research is to establish the cost influencing factors with the new concept and methods to help in the control of expenditure and forecasting of probable future cost of building security. This study used qualitative phase of mixed methods research for the exploration of the cost influencing factors. Phenomenological design was employed for data collection and analysis. Three main categories were identified to sort responses to the questions, out of which only two categories were directly related and under the scope of this study with 11 factors emerged from these two categories. The Severity index analysis (S.I) was performed to rank these key cost influencing factors. The result shows no significant gap between the factors with intruder detection, location of building, and use of building ranked above 87%. Therefore, all the factors generated from this study will positively influence the building security cost.

Keywords: building security, building characteristics, cost influencing factors, mixed methods sequential exploratory design, phenomenology design, severity index.

INTRODUCTION

Security is increasingly having importance attached to it worldwide. The historical background of housing cannot be separated from criminal activities committed within houses which often follow a forceful entry by perpetrators (Anifowose, 2011). In some scenarios, the level of security of a particular locality or region tends to form the basis for the measurement of its social and economic development. The security of life and properties in the built environment is of great importance to the socio-economic, health and general wellbeing of people around the globe. In Nigeria violence and criminal activities have assumed a dangerous tendency; as its threaten life and property, the national sense of wellbeing, peace, security and social order, eventually reducing the citizens' quality of life (Afon & Badiora, 2013; Agbola, 2004). Crime and violence are typically more severe in urban areas and are compounded by its rapid growth. According to Ahmed (2012), the growth in urban crime have become a major problem facing most developing countries like Nigeria. Crime is an economically important activity which is almost completely neglected by economists (Omotor, 2010). This neglect however makes the economics of crime a relatively new field for economic investigation into the outstanding increase in criminal activities over last four decades in Nigeria (Hills, 2008; Omotor, 2009, 2010). The main objective of this research is to establish the key factors influencing

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building security cost in urban environment as a result of frequent escalation in costs of maintaining security in houses; as this will help in controlling of expenditure and forecasting of probable future cost of building security. However, the scope of this study covers only qualitative phase of the mixed methods sequential exploratory research. The results from this study will lead to further research using quantitative phase of the mixed methods sequential exploratory research in subsequent study.

LITERATURE REVIEW

The literature on theoretical security issue explores the increasing connections between capital and security. Neocleous (2007), explores the rise of the security industry in the context of the current 'war on terror', before connecting this to the rise of a parallel industry in policing and incarceration. Also, further feature of recent literature on security is the idea of a convergence of internal and external security (no doubt influenced by the notion of the world as a global village). Olavarria-Gambi (2007), estimates that the economic cost of crime in Chile, using the accountancy method, is \$1.35 billion as at 2002, equivalent to 2.06% of Chile's GDP. Crimes included in the estimation are murder, robbery, larceny-theft, burglary, wounding, rape and sexual assaults, domestic violence and economic felonies such as fraud, forgery and so on. Consequential costs are the most important, representing 68% of the total cost of crime. Government spending represents 23% of the total and anticipatory cost account for the remaining 9 percent.

In Nigeria, crime has grown to nearly epidemic proportions, particularly in urbanized areas characterized by rapid growth and change, by stark economic inequality and deprivation, by social disorganization, and by inadequate government service and law enforcement capabilities (Fajemirokun, Adewale, Idowu, Oyewusi, & Maiyegub, 2006; Usman, Yakubu, & Bello, 2012). Total reported crimes rose from almost 211,000 in 1981 to between 330,000 and 355,000 during 1984-85 (Alemika & Chukwuma, 2007; Usman et al., 2012). Although serious crime usually constituted the larger category, minor crimes and offences accounted for most of the increase. Crimes against property generally accounted for more than half the offences, with thefts, burglary, and breaking and entering covering 80 to 90 percent in most years. Assaults constituted 70 to 75 percent of all offences against persons (Anifowose & Oke, 2008; Jones, 1993). The survey shows that most residents are ignorant of many safety aspects in their homes. Abrahamsen and Williams (2009), states that Security Sector Reform (SSR) has become a central part of development policy, given an increasing recognition of the links between security and development. They observed that such reform programs are exclusively focused on the public security sector, neglecting the extent to which people in developing countries have come to rely on private security providers for their daily security needs.

Hence, it is evident that the security of persons and properties are important to both individuals and government. From the literature available works on empirical relationships between cost influencing factors and building security features have not received detailed research attention, this is the gap in literature this study aim to bridge.

RESEARCH METHODOLOGY

This study used qualitative phase of mixed methods (sequential exploratory research), phenomenological research design was employed for collecting and analyzing the data. In phenomenological design Creswell (2012b), stated that: “The researcher identifies the ‘essence’ of human experiences concerning a phenomenon, as described by participants in a study. Understanding the ‘lived experiences’ marks phenomenology as a philosophy as well as a method, and the procedure involves studying a small number of subjects through extensive and prolonged engagement to develop patterns and relationships of meaning.” In this regard, the researcher’s “brackets” his/her own experiences so as to understand those of the participants in the study. Onwuegbuzie and Leech (2007) suggested the minimum sample size for a qualitative research design by referencing two previous authors: (e.g., ≤ 10 interviews Creswell (1998), and ≥ 6 Morse (1994)). Several authors have used this qualitative research design in conducting their research, example of this is a recently conducted research in teaching and teacher education: a phenomenological study of an international teaching practicum by (Kabilan, 2013). Furthermore, many authors have engaged in counselling psychology studies with the used of phenomenological research design, some of which are: (Arminio, 2001; Friedman, Friedlander, & Blustein, 2005; Mauzey & Erdman, 1997; Muller & Thompson, 2003), while Creswell, Hanson, Plano, and Morales (2007) offers more explanations on the types of research questions, qualitative design and illustrative interpretation in respect to qualitative research design. The instrument phenomenological seek to explore the lived experiences of experts’ to illuminate a particular phenomenon (Creswell et al., 2007). The phenomenon illuminated in this present research study is the factors affecting building security cost.

The qualitative interview questions were formulated to investigate the factors influencing building security cost in urban environment in Nigeria. The interview questions were designed in the form of semi-structured interview questions (i.e., open-ended questions) in order to discover the factors affecting building security cost. According to Sekaran and Bougie (2009) open-ended questions offer respondents the opportunity to answer the questions in any way they choose. Thus, the factors generated from this qualitative phase will serve as data for subsequent quantitative phase; this is the nature of sequential exploratory design (Creswell, 2012b; Creswell, Plano-clark, Gutmann, & Hanson, 2003).

The interview protocol was set to comprise two (2) main semi-structured open-ended questions. The aim is to determine the cost-influencing factors of building security in Nigeria urban environment. Therefore, the following questions were asked:

- i) What factors constitutes the cost of building security in urban environment?
- ii) What factors of building influences cost of building security in urban environment?

The semi-structured interview allows participants (i.e., both interviewees) to discuss and pen down their interpretations of the world in which they live in and articulate how they regard situations in their own opinion (Cohen, Manion, & Morrison, 2011; Joy, 2007). The participants were drawn from the construction professionals and academics within the School of Environmental Technology, Federal University of Technology Minna. Those experts in built environment comprises of Architects, Builders, Quantity Surveyors, Urban and Regional Planners, and Estate Surveyors and

Valuers. They were purposefully selected based on their involvement with housing within the built environment.

The qualitative data is a text or narrative data in nature which usually comes in different forms and from a range of sources from which the researcher may have brief responses to open-ended questions, transcript from an interview or focus group, notes from a log, field notes or the text of published report (Taylor-Powell & Renner, 2003). The data may be from a few individual, many people or a single case. "Open-ended questions and written comments on questionnaires" is among one of the nine methods of data collection recommended (Taylor-Powell & Renner, 2003), and was used to sourced data from the respondents. The questionnaire was individually given to the purposefully selected respondent at their own convenient period following a prior notification.

Data Collection

The qualitative data collection method was in two sections. The first section of the primary data collection techniques involve the used an open-ended questionnaires. The first part contained the preambles: brief introduction, title, objectives and the qualitative research questions. The second part was divided into six rows; the first row was created for respondents' demographic information, while the remaining five rows were meant for respondents to explain and exemplify one point or factor as affecting the subject matter only in one row. However, the text data involves 10 Purposefully Selected participants in five different disciplines two each from Architects, Builders, Quantity Surveyors, Urban and Regional planners, and Estate surveyors and valuers. The selection of these professionals was based on their involvement with housing within the built environment.

The second section used close-ended questionnaires to advance on the initial first section of primary data collected. However, these methods were suitable for this section of the study, as (Kabilan, 2013) also used the methods in his study to discerned the teachers' voices and experiences as part of the phenomenological research process. Interpretative phenomenological analysis (IPA) of data could be used on written data obtained from the above data collection method (Kabilan, 2013). He stated further that data acquired from any appropriate form of written texts would have phenomenological undertones. IPA is wed to a phenomenological epistemology which gives experience primacy about understanding people's everyday experience of reality in great detail, in order to gain an understanding of the phenomenon in question (Braun & Clarke, 2006). The research questions were developed based on the classification of the responses to the questions. Questionnaire was developed to source data from a larger sample size. This was carried out in order to have larger views on the themes and categories already established by the respondents. Thus, the respondents were required to grade the previously established factors from qualitative part one on a likert scale 1-5, the extent to which factors in their own views and experiences influence building security cost. However, a sample size larger than 30 and less than 500 are recommended for most research studies (Anifowose, Ola-awo, & Mohammed, 2013). In order to produce a reliable and convincing results a typical survey requires a minimum response rate of 30% (Ali, Kamaruzzaman, Sulaiman, & Peng, 2010). Therefore, a total number of 50 questionnaires were distributed to construction experts aforementioned based on a simple random sampling selection, while 41 questionnaires were returned and found useful and valid for the analysis at 82% response rate.

Data Analysis

Qualitative data consist of words, observations and deal with meaning. The analysis of these data is not quick and easy. As with all data, analysis and interpretation are required to bring order and understanding which require a creative discipline and a systematic approach, although there is no particular or best way (Crane, 2010; Taylor-Powell & Renner, 2003). The process depends on: the research questions, the needs of those to use the information, and the researcher's available resources. In qualitative data analysis, the collection and analysis of data often occurs at the same time (Woods, 2006). However, Creswell (2008) listed six interrelated steps involves in an interpretation during data analysis process as follows: (i) prepare and organize the data for analysis, (ii) read through all the data (iii) explore and code the data, (iv) coding to build description and themes, (v) represent and report qualitative findings, (vi) interpret the findings, while Ivankova (2004) added step (vii) validate the accuracy of the findings. Furthermore, the types of qualitative and quantitative data analyses were presented in figure 1 below.

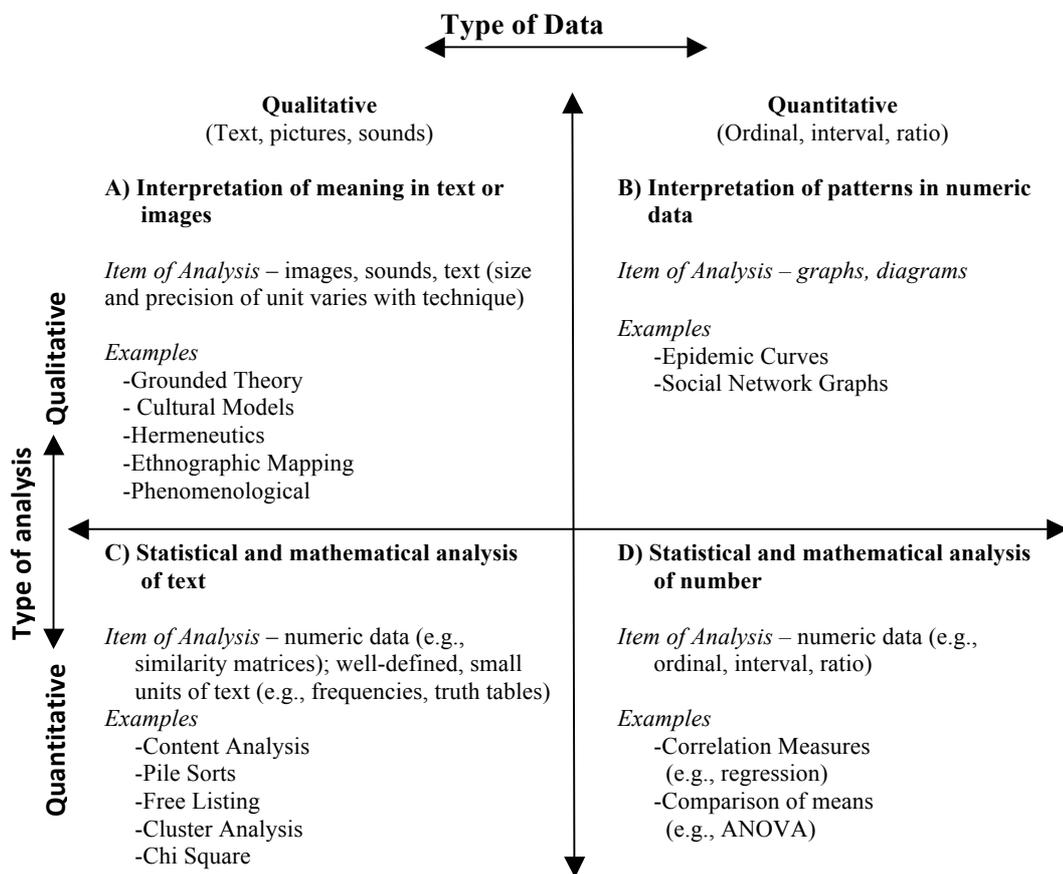


Figure 1: Qualitative and Quantitative Data Analysis

Source: Adapted from Introduction to Applied Thematic Analysis/(Bernard, 1996).

The themes for this research were identified through five-stage process in line with the previous researchers. The steps are: 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 influencing building security cost within the built-environment. Table 1 presents the categories that were identified to sort responses to the questions, while Table 2 presents the description of factors affecting building security cost.

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, perimeter protection, and security-house, (d) 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

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 and 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 carried out to determine the degree of impact of each factor, using relative importance index analysis. Relative importance is one among the four techniques recommended by (Crane, 2010; Taylor-Powell & 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), which is known as relative importance index (RII) 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. Severity Index (SI) Formula is presented in figure 2: Equation 1 & 2 below:

$$S.I = \left\{ \sum_{i=1}^{i=n} w_i f_i \right\} \times \frac{100\%}{n} \dots \dots \dots (Eq1)$$

Figure 2: Severity Index Formula

$$w_i = \frac{i}{A} \dots \dots \dots (Eq2)$$

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.

Kvale (1996) suggests three distinctive criteria for the validating qualitative study, which is also applicable to a qualitative approach of mixed methods: (i) validity as the quality of craftsmanship, (ii) validity as communication, and (iii) pragmatic validity as action. In addition Lincoln and Guba (1986); Schwandt, Lincoln, and Guba (2007), recommended techniques to assist researchers in establishing research credibility, as well as prolonged engagement in the field, triangulation of research methods and data sources. Both recommendations are necessary and very important for research findings and the phenomena of the study to ensure that research is transferable between the researcher and the participants (Creswell, 2012a). The uniqueness of the qualitative study within a specific context precludes its chance of being exactly replicated in another context (Ivankova, 2004; Ivankova, Creswell, & Stick, 2006). Therefore, the statement about a researcher’s positions: the selection of participants, the biases and values of the researcher – enhance a study’s credibility and trustworthiness (Creswell, 2003; Ivankova, 2004). This study used six primary verification procedures to determine the credibility of information to see if it matches those in the database. This process includes: using triangulation of methods, using member checking, establishing inter-coder agreement, providing rich, descriptions to convey

the findings, providing disconfirming evidence, and auditing. Table 3 presents the frequency of the respondents based on their job title.

Table 3: Frequency of respondents based on the job title

Job title	Frequency	Percent	Valid Percent	Cumulative Percent
Architects	8	19.5	19.5	19.5
Builders	8	19.5	19.5	39
Quantity surveyors	14	34.1	34.1	73.2
Urban and regional planners	6	14.6	14.6	87.8
Estate surveyors and Valuers	5	12.2	12.2	100
Total	41	100	100	

Ranking of the Cost Influencing Factors

The study employed both mean score and severity index (SI), which is also known as relative importance index (RII) analysis (Cheng, 2014), to establish the degree of the impacts of the variables (i.e., security measures) on the building security cost as shown in Table 4 & 5. 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 4: Building security measures

Rank	Security Factors	Mean(n=41)	Standard Deviation	Severity index%
1	Intruder Detection	4.68	0.567	94
4	Access Prevention	4.27	0.672	85
5	Perimeter Fence			
5	Protection and security-house	4.11	0.819	82
6	Security Lighting	3.95	0.921	79

Table 5: Building characteristics

Rank	Influence Factors	Mean(n=41)	Standard Deviation	Severity index%
2	Location of Building	4.61	0.666	92
3	Use of Building	4.37	0.888	87
5	External Wall Openings	4.12	0.899	82
5	Height of Building	4.10	0.831	82
7	Size of Building	3.90	0.735	78
8	Plan Shape	3.76	0.943	75
9	Aesthetics	3.59	0.999	72

In term of ranking for individual factors, as shown in tables 4 and 5, Intruder Detection proved to have the highest ranking 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 second highest is

location of Building 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. 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%, while access prevention was ranked fourth with the mean value of 4.27 and S.I value of 85%. Perimeter Fence, Protection and security-house; External wall opening; and height of building were ranked fifth with S.I value of 82% respectively. Security Lighting had the sixth 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. Size of Building was the seventh-ranked factor affecting building security cost with the mean value of 3.90 and S.I value of 78%, while plan shape was ranked eight on the table of ranking having mean value of 3.76 and S.I value of 75%. Whereas, 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. Thus, balancing every aspect of building with one and other without compromising one for another will definitely affect the building cost.

CONCLUSION

This research employed qualitative part of the mixed methods sequential exploratory design, to explore the cost influencing factors on building security as a result of increasing costs of maintaining security in urban environment. Phenomenological technique was used for the data collection and analysis. Categories were identified to sort responses to the questions from the interview conducted, with eleven (11) key factors emerged from the two main categories. Severity index analysis was then conducted to rank these key cost influencing factors. The results revealed that intruder detection, location of building, and use of building are the three major determinant of building security cost with S.I ranging between 94% and 87%. Although, all the factors established in this study are considered having strong relationship with the building security cost as a result of high relative importance depicted by the severity index (S.I) analysis when compared with the previous studies conducted by (Idrus & Newman, 2002) where the top five factors were ranked between 89% and 78%. Therefore, all the factors generated from this study will significantly influence building security cost. Also, this study is helpful in the supply of equipment and building security systems to be more economical and efficient as one of the sustainable design method, as well as adding to the existing literature.

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