

OBJECTIVE EVALUATION OF CPTED PRINCIPLES IN URBAN CONTEXT: A SYNTACTIC ANALYSIS OF HAYATABAD PESHAWAR

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ABSTRACT

With rapid growth of urban population worldwide and specifically in Pakistan, the focus on improving quality of life in cities is more than ever. Numerous varying factors contribute to the fact and a major aspect is that of fear of crime. As a pre-empt, occurrence of crime in the urban fabric is catered to with varying strategies but studies find that spatial configuration and environmental design while being a major contributor do often get neglected in the planning process. This research conducted on Hayatabad Peshawar pinpoints the crime hotspots of the planned area through UCL Depthmap. These hotspots are further investigated to evaluate the status of application of Crime prevention through environmental design (CPTED) strategies in the subject area. The study finds that the said strategies are variably present, where some are catered to, others absent and a number only partially exist.

Keywords: CPTED, Crime, Space Syntax, UCL Depthmap.

INTRODUCTION

Cities are the fundamental unit of our living environment and it is absolute essential to make our cities safer. Maslow (1954) in his model of the hierarchy of human needs, identified the requirement for safety and security as one of the fundamental needs. Urban planners, Patricia Brantingham observes, often manipulate land use controls to affect specific social and economic goals. One prominent social goal, crime reduction has rarely been considered by planners. Planners “think of parks and noise levels, but not of crime” (Piombini, 1987). Recent research supports these beliefs, and suggest that planners may be unwittingly contributing to urban crime problems by creating environment that promote crime and fear of crime (FOC) (Gardiner,

1978). Current environmental criminology methods and theories focus on the physical characteristics of targets rather than on the spatial configuration of the street grid and the spatial layout of the urban environment (Jones & Fanek, 1997). Even the disciplines of criminologists agree that both spatial and physical factors could play a role in the way criminal activities take place.

Thousands lives of peoples are affected annually due to the social issue of crime. Community’s safety has significant threat due to crimes such as robbery, murder and break-ins. Fear of crime restrict People’s freedom of movement and discourage them for participation in community life. Various solutions are required to resolve the complex problems of

crime and FOC. The goal of crime reduction could be successfully achieved by involving design strategies, law enforcement and community action.

LITERATURE REVIEW

It was in the 1960s that Elizabeth Wood came to be the first person that had recognized the co-relation between the crimes that occur and its physical space where it takes place (Wood, 1961). Then, later in the 1970's, the development of defensible space theory influenced by ideas put forth by Jacobs (1961) and Newman (1972), stated that certain physical environment features such as territorial indicators and opportunities for surveillance that if dealt with, would go on to result in reduction of crimes rate. The initial researches into defensible space theory (Shaw & Gifford, 1994) moved along the way to explore direct links between the design features of the physical space and spatial layout with the crime rate for the under-study area. In this regard, Jeffery (1971) has made significant contributions by exploring and analyzing illegal and anti-social behaviors which directly relate to and explore the type of crimes and how they occur. Beside that in accordance with Newman's proposition, there are four primary design aspects that individually and collectively play part in the idea of Defensible Space, Building image, Surveillance, Territoriality, and Juxtaposition of residential with other facilities (Colquhoun, 2004).

There are three basic strategies that are defined by Federal Emergency Management Agency (FEMA, 2007) for secured design: natural access control, territorial reinforcement and natural surveillance. It is in this way that the theory of Crime Prevention through Environmental Design (in short referred to as CPTED) is developed and was based on the studies of last 5 decades. The ideas of CPTED could assist in the reduction of crime incidence and the resulting fear and insecurity and thus provide for improved quality of life (Crowe, 2000). The predictors of diversity of usage, property maintenance, level of activity, surveillance, natural safety, contact with neighbours, clear demarcation of public and private space, the capacity to keep an eye on the street, the presence of people during the day and night, as well as a high rate of pedestrian use of sidewalks were listed factors that allow for and add to the defensibility of a space thus looking after such

factors at the planning stage are of acute importance (Jacob, 1961). On the similar notes, Angel (1968) found that the level of activity on the street was inversely linked to the rate of crime on the street. Newman (1972) compacts his study findings that defensible space is such that it allows for people to see and be seen constantly, while additionally people should also be willing to intervene in case of any unwanted activity taking place. Thus, people are not only more likely to interact with each other but also the intervention makes for feel safe environment in the neighborhood with the human activity taking place all around.

Furthermore, the "broken windows" theory (Kelling & Wilson, 1982) looks into the effects that are caused by visible bad-condition of physical space in neighborhoods on behavior and found that building condition plays role in the crime prevention therefore the property of maintenance is added as a CPTED approach to the list along with surveillance, access control and territoriality. The studies conducted by Clark (1997) suggests improvements to the environment management and design in order to decrease the opportunity to offend while Jeffery (1990) devised a CPTED model that claimed that the environment impacts human behaviour through the brain, indicating that crime prevention models must incorporate both the brain and the environment. Along the very same lines, Crowe (1991) went on further to analyze the applications of space management and design principles for the crime prevention through environmental design.

One way to look at the CPTED principles is to see that it strives to activates community into positive social activities by making it more responsible and asking it to take ownership of their own space to better its quality, and to benefit from natural surveillance (Cozens, 2008). Furthermore, Alexander, Ishikawa and Silverstein (1977) evolved a design framework of patterns that would help in reduced crime rates in the area. Also, Schneider and Kitchen (2002) explore the dimension of study where they found that the way People's perceptions of crime in terms of fear of crime (FOC) change across time and age groups. For example, people keep away from dark areas, parks and quiet streets, in the late hours due to FOC. On the reciprocal, city centers can exhibit fear for elderly people at nighttime. Yet, FOC is a factual and strong force that shapes our daily

routine, and its levels can be altered in people's minds through media coverage and other factors.

A number of studies have been conducted that vary in its kind and parameters to evaluate CPTED principles (Brangtingham & Brangtingham, 1993) where most are based on CPTED factors (Sakip & Abdullah, 2011, Taylor, Schumaker & Gottfredson, 1985) and FOC (Nair, Ditton & Phillips, 1993, Vrij & Winkel, 1991, Lewis & Maxfield, 1980). In this way, the theory of CPTED developed to address the problem of crime.

National crime prevention institute define CPTED as:

The proper design and effective use of the built environment can lead to a reduction in the fear and incidence of crime, and an improvement of the quality of life." (Crowe, 2000). Over time, CPTED design techniques have evolved. The relationship between built environment and criminal activity with reference to urban design has only been materialized during last few decades, although many strategies have been in used from hundreds of years. CPTED strategies gives comprehensive guidelines that, as a contractor, property owner and remodeler, you could apply for the reduction of crime and FOC to improve the quality of life.

SPACE SYNTAX THEORY

The space syntax theory was first introduced by Steadman (1983). One year later, Hillier and Hanson (1984) published a book by the name of "Social Logic of Space" which formed the basis for the theory space syntax. Space syntax is a method for interpreting the socio-spatial configuration and formation of space in architectural and urban contexts by employing analytical, quantitative and descriptive techniques in order to comprehend the social logic of space (Hillier & Hanson, 1984, Wineman, Peponis, & Dalton, 2006, Dursun, 2007, Önder & Gigi, 2010, Hillier, 1996, Hillier, Hanson, & Garham, 1986, Jeong & Ban, 2011, Dalton & Bafna, 2003). Hillier showed that crimes are most likely to occur at places where connectivity is low and are quieter (Colquhoun, 2004). Thus, busier streets with more pedestrian movement record less crime (Hillier & Shu, 2000).

Space Syntax theory investigates the social features of samples through four basic variables. These are Integration, Connectivity, Choice and Control

(Klarqvist, 1993). Depth is an extra factor that can aid the analysis in a variety of ways. It is defined as the fewest number of syntactic steps in a graph that are required to get from one to the other (Klarqvist, 1993). The three primary definitions for spaces are Axial, Convex and Isovist space (Penn, 2001) which constitutes three applicable analysis systems by the same names: Axial (Turner & Penn, 1999), Convex (Klarqvist, 1993) and Isovist (Turner & Penn, 1999). Space syntax clarifies how spatial configuration impacts the socio-cultural existence (Dursun, 2007).

RESEARCH METHODOLOGY

Referring to the space syntax method, the research study seeks to identify locations that lack some of the predictors of defensible spaces using syntactic analysis in order to give a reliable basis for future design recommendations. Thus, the study has applied the Axial Map analysis to investigate spatial syntactic variables through a simulation with UCL Depth map software.

By giving syntactic values to each street segment in the system (e.g., all street segments in Hayatabad), spatial layout was examined using space syntax methodology. Connectivity and Integration are the two space syntax indices used. They were calculated using UCL Depthmap. The Depthmap, a software developed by Alasdair Turner at University College of London (UCL). First, each area of Hayatabad's map was translated into an AutoCAD format. To prepare the axial map, another layer was added on top of the map. A network of crossing axial lines makes up the axial map. In simple words, the axial map is created by drawing the lines of sight that define each street section, in the area. For example, if two individuals stand at ends of one of these lines, they will be able to see each other. These lines were manually drawn on the map with AutoCAD software. Hayatabad consists of an average 1107 axial lines.

Second, the software computed the Connectivity and Integration values, for each line in the system as shown in Figures 2 and 3. To provide an explanation of these two measures, Connectivity indicates the number of lines directly connected to a single line. Whereas Integration evaluates how easily one can reach a line. Mathematically, it represents the number of spaces one needs to cross in order to access a given line from all the axial lines in the

system. In simple words these measures indicate whether a specific location within the system is connected (easily accessible from other areas) or more isolated (must pass through several spaces to reach that selected location).

DATA AND ANALYSIS

The analysis relied heavily on two types of variables: neighbourhood street layouts (Figure 1) and the related values derived from Space Syntax analysis as the independent variable, and rates of various sorts of crime as the dependent variable.

Figure 2 is the Hayatabad axial map, which shows the longest and fewest straight lines spanning the usable convex regions.

Figure 1
 Street Layout Plan of Hayatabad Peshawar. Source: Author



Figure 2
 Axial Map of Hayatabad Peshawar. Source: Author



SYNTACTIC ANALYSIS

Axial map of Hayatabad, Peshawar was analyzed to get the syntactic values. Summary of the analysis are presented below.

Global Integration

In case of Global Integration, the least integrated streets of Phase 1 having values less than 1 are 4 and 73 of D1, Graveyard Road, 1A, 10A, 12, 13 and 14 of E1 and 19 of E3. The least integrated streets of Phase 2 having values less than 1 are 1A,2A,4A, 5A,10A and 11C of G3 and 1C. The least integrated streets of Phase 3 having values less than 1 are 3A of K1, 18,20 and 21 of K2, 7B of K6, KPPRA Road. Street A and B. The least integrated of Phase 4 streets having values less than 1 are street I of P1, 11A of N-1, and 3C and 5B of N5. The least integrated streets of Phase 5 having values less than Shaukat Khanam Road and street 3C of C4. The least integrated streets of Phase 6 having values less than 1.02 are 22A and 22B of F9. The least integrated of Phase 7 streets having values less than 1 are 12, M and N of E8.

Figure 3
 Global Integration Map of Hayatabad Peshawar. Source: Author



CONNECTIVITY

In case of connectivity streets of Phase 1 having minimum connectivity of 1 are street 11,13,14 of E1 and 12A of E2 and 13A of D5. Streets of Phase 2 having minimum connectivity of 1 are street 5 of H-4, 21A and 21B. Streets of Phase 3 having minimum connectivity of 1 are streets 11 and 2A of K6, 10B and 8B of L-1, 16 of L3 and B. Streets of Phase 4 having minimum connectivity of 1 are street J of P-1, street 4A of P-2, 4A of N2, 5B of N4. Streets of Phase 5 having minimum connectivity of 1 are street

1A and street B of A-1, street 5A of C-2, and street 3C of C-4. Streets of Phase 6 having minimum connectivity of 1 are street 19A of F-9, street 15, 16 and 17 of F10. Streets of Phase 7 having minimum connectivity of 1 are street 3B and 11 of E-4, street 5, 6 and 15A of E-5.

Figure 4
 Connectivity Map of Hayatabad Peshawar. Source Author



Space syntax analysis identified areas with low global integration and connectivity. These two factors are strongly correlated with crime occurrence according to previous research conducted by Jones and Fanek (1997). The crime hot spots areas identified through space syntax are encircled in Figure 5.

Figure 5
 Axial map of Hayatabad Peshawar showing crime hot spots. Source: Author



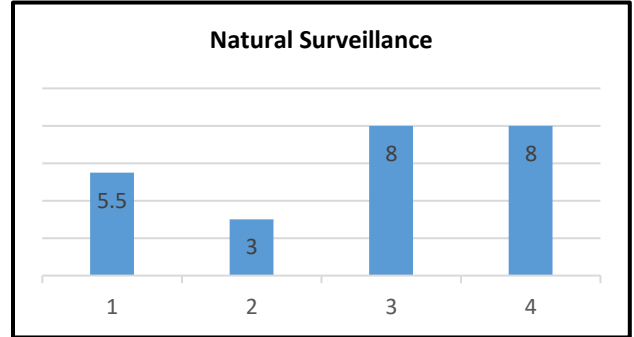
Evaluation of CPTED Principles

The crime hot spots identified through Space Syntax Methodology using UCL Depthmap software were evaluated for CPTED principles.

Natural surveillance

The primary assumption is that criminal doesn't want to be observed. The apparent risk to the criminals can be built by putting real 'eyes on the street' or observation. This was evaluated using four parameters. (i) Are shrubs and landscaping trimmed to allow unobstructed views. (ii) Are front boundary fences visually permeable, or low enough to allow unobstructed views. (iii) Are there any blind spots that may act as hiding spaces. (iv) Are different Land-use activities present.

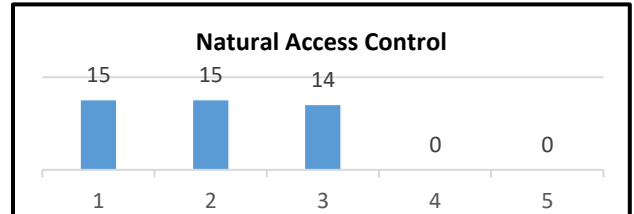
Figure 6
 Natural Surveillance Result. Source: Author



Natural access control

Natural access control relies on physical components such as doors, shrubs and fences to retain unauthorized people out from a specific place if they don't have a genuine purpose for being there. This was evaluated using five parameters. (i) Do pathways and landscaping designed to guide visitors to the entrance while keeping them away from private areas. (ii) Are the bins fixed in position to deter anyone from using them as a means of climbing. (iii) Is adequate fencing provided around property. (iv) Is there any signage that warns intruders of the security measures used on surrounding property. (v) Is there any psychological barrier available on surrounding property.

Figure 7
 Natural Access Control Result. Source: Author

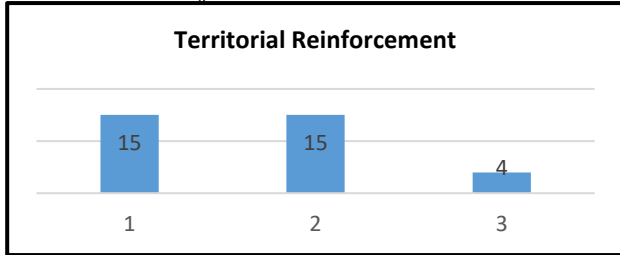


Territorial reinforcement

Individuals usually protect a territory they consider to be their own, while have a certain respect for the other area. This was evaluated using three parameters. (i) Are property boundaries and private spaces delineated using plantings pavement designs, low walls or fences. (ii) Is there clear distinction between Private vs. Public Property. (iii) Is street number clearly visible from the street.

Figure 8

Territorial Reinforcement Result. Source: Author

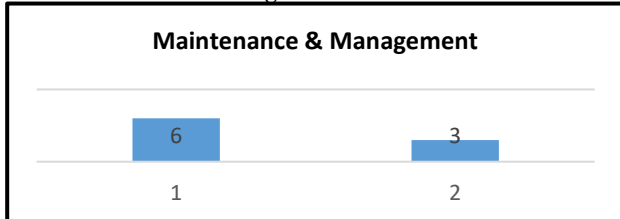


Maintenance and management

The idea of maintenance and management is related to the territorial reinforcement and sense of ‘pride of place’ of the neighborhood. Undesirable activities are likely to be attracted by a dilapidated area. This was evaluated using two parameters. (i) Are trees and shrubs surrounding the property managed and maintained. (ii) Are lighting fixtures in good operating condition.

Figure 9

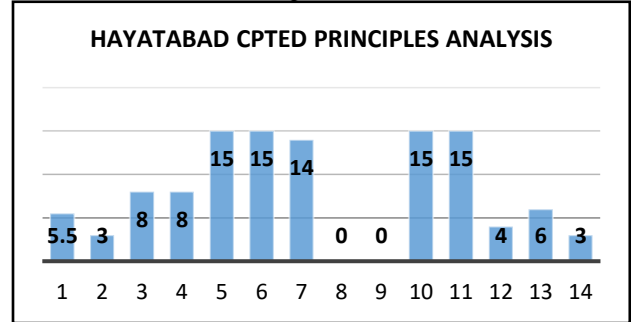
Maintenance & Management Result. Source: Author



Phase 6 least integrated streets identified by UCL Depthmap didn’t evaluate for CPTED principles as these streets are under the control of Frontier Constabulary (FC) and the area is public restricted area due to security issue.

Figure 10

Overall CPTED Principles Result. Source: Author



CONCLUSIONS

Through this research potential areas for crime occurrence with reference to spatial configuration using space syntax were pin pointed. The level of implementation of Crime Prevention through Environmental Design (CPTED) principles for crime prevention was explored. The research found that in the potential hotspots, while some of the CPTED principles were about adequately catered to, there was still room for a number of factors to be improved upon.

Factors that are adequately catered are: pathways and landscaping designed to guide visitors to the entrance while keeping them away from private areas. Bins fixed in position to deter anyone from using them as a means of climbing. Adequate fencing provided around property. Property boundaries and private spaces delineated using plantings pavement designs, low walls or fences. There is clear distinction between Private and Public Property.

Factors that are partially addressed are: Shrubs and landscaping trimmed to allow unobstructed views. Blind spots that may act as hiding spaces. Different Land-use activities present. Trees and shrubs surrounding the property managed and maintained. While majorly lacking factors included: Front boundary fences visually permeable, or low enough to allow unobstructed views, Signage for warning of security measures, psychological barrier to notify the surrounding activity, clearly visible Street Number and adequate light fixtures. Thus, the research not only pin pointed the actual crime hotspots but also puts forth the majorly lacking factors that contribute to it and can be improved.

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