

# Recognition of the Impact of High-Rise Construction on The Security of Residential Areas based on Environmental Design

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## ABSTRACT

Feelings of comfort and safety are among the most important issues that sustain cities, and crime is one of the most important factors in reducing the level of safety in society. There are many theories available in the field of urban crime, but due to the high cost and inefficiency of these methods, crime prevention strategy and investigation of the principles of this approach becomes more and more necessary through the design of urban environments. This theory claims that with proper use and density and environmental design, in addition to reducing criminal opportunities, the quality of life can also be increased. The purpose of this paper is to identify the causes of reduced security in urban residential areas and to examine the relationship between these factors and high-rise construction. Therefore, using descriptive and library methods, the relationship between density and security is examined and finally the practical strategies of this theory are explained to prevent crime in residential areas.

**Keywords:** High-Rise Construction, Security, Urban Crime, Environmental Design

## INTRODUCTION

As a method to create more urban space, high-rise construction has attracted human attention around the world for more than a century. The industrial revolution in Europe and the following developments in the 18th and 19th centuries led to the creation of new cities, followed by the construction of tall buildings in today's style. In the twentieth century, issues such as population growth, the need to accommodate more people in cities, the need to use land in densely populated urban areas, the demand for people to live or work in urban centers, and the reduction in costs caused by horizontal urban expansion were considered among the reasons for construction of high-rise buildings as a necessity in world's major cities (Golabchi, 2001; Ardekani et al., 2020). Since the architecture and style of the building play an important role in shaping the relationships, mood and culture of the residents, the body of many urban spaces and buildings has provided backgrounds for the emergence of Western and European culture in Iran (Mohammadi, 2012; Pearson, 1997). Apartments themselves are divided into two groups, in which conventional and short buildings are up to 8 floors and taller ones are called towers or high-rise buildings. In addition to the energy sector, the threats posed by high-rise buildings are also seen in the field of usage, and it overshadows issues such as spatial quality and security. Collective spaces, if properly designed to accommodate residents, can become areas for interaction and exchange of views. In addition to being used for any residential, commercial, or office use, high-rise buildings

can also be used for integrated functions and to centralize related activities. Implementation of simple and regular forms, in addition to contributing to the stability of the building, increases safety in tall buildings. Proper order and combination with the surrounding buildings, balance, symmetry and unity, are effective factors in creating the desired visual form and appearance of tall buildings. To create a human scale and optimize the form of the building, it is possible to create a good relationship between the form and the viewer by creating a depth of view of the building in the space around the building (Golabchi, 2001; Salehi, 2008).

## Definition of security

Security is the immunity from forced occupation without satisfaction. Security for individuals means that people are not afraid of their legitimate rights and freedoms, so that their rights are not endangered at all, and no factor threatens their legitimate rights. In this sense, the necessity of security in society is derived from the nature of human rights, and the requirement of legitimate rights and freedoms is their immunity from aggression and the avoidance of security risks and threats. Risk includes any possible factor that leads to the violation of legitimate rights of individuals (HatamiNejad et al., 2013). Basically, human beings need a sense of security in order to achieve human goals after satisfying physiological needs, and more important than security is the sense of security. Some experts see the sense of security in a society as more important than security since although there may be

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disciplinary and police security in societies, but one may not feel safe. In other words, security begins with the individual and ends with the family, the community, and ultimately the international system. In a safe city, safety is provided in urban spaces, and the person feels safe and secure in the city (Salehi, 2008).

### Human need for security

Security has long been a major human concern. Since ancient times, security has been the most important element of life after water and food. Abraham Maslow, a humanistic psychologist, prioritizes basic human needs in order of importance, and puts security immediately after physiological needs (including air, food, housing, and clothing), and considers other human needs at next, despite the urgent need for them; because it is believed that such human needs become meaningless in the absence of security and peace of mind.

### Types of security

•Personal security: A situation in which a person lives without fear of damaging or losing his life or property or reputation.

•Social security: "Social security is the ability of a society to defend his characteristics against real and potential changes and threats. Social insecurity arises when societies feel that their identity is at stake (Mazloom Khorasani, 2006; Ahmad and Esmali, 2010; Ahmadi and Kaldi, 2013).

•Urban security: Security is a general concept that includes the state of health, peace, well-being of the individual and the stability of society, and in fact, the protection from being harmed by others. In general, urban and social security involves "a space that includes both objective and subjective dimensions." In the objective dimension, social security means safe and secure conditions and its preservation and expansion for members of society in the face of external factors; Such as the city riots, crimes, etc. (not in the face of traffic accidents, floods, fires, earthquakes, and the like), and the mental dimension of social security means a sense of security and comfort" (Hezar Jaribi, 2014).

•Environmental security: Humans and the environment in which they live are inseparable from each other. This environment is the space and arena for the implementation of social functions, and many social interactions take place in it. Security is one of the most basic needs to maintain and survive these interactions and for the active presence of people in these spaces (Poor Jafar, 2008; Parto and Ziabakhsh, 2015).

### Indicators of security analysis in urban environments

Security means being safe from fear and intimidation, and is one of the basic human needs. Each of the different dimensions of security has been the subject of work in

different fields. In urban planning literature, security is presented as urban security and security in the urban environment. In recent years, the mission of urban planning in terms of improving the level of security has been more focused on how to design spaces and plan appropriate urban uses. In this regard, we can point to the crime prevention approach through environmental design in the design and planning of the environment and urban landscape, which seeks in improving safety in the city and thus helping residents feel safe by observing special standards in the construction and appearance of the physical environment. Therefore, safe urban space has vast and extensive objective and physical features and components, which sometimes have reciprocal effects. But in addition to that, a safe city environment also requires social interactions; as the peace and security of cities is not provided by the police alone. Rather, peace and security are maintained, mainly through the creation of a complex and almost unconscious network of oversight and voluntary observance of norms among the people themselves, and are carried out by the people themselves (Salehi, 2008). These indicators include the following:

1. Physical characteristics that affect the security of public spaces

- Quality of the passage network
- Urban furniture
- Lighting
- Vegetation
- Texture density
- Closed and open environment
- Functional indicators affecting the security of public spaces

• Social (mental) characteristics affecting the security of public spaces

### The Neighborhood

In order to define a neighborhood unit, very different opinions have been expressed according to various views and emphases, which have been expressed in six categories.

The first category includes definitions based on some quantitative characteristics such as: population, radius (access), size, edge, density, block, elementary school and number of residential units, etc. A neighborhood unit often focuses on a primary school and has a mixed social population of between 10,000 and 5,000.

The second category includes the definitions provided by new-city creators. They define a neighborhood unit based on the distances that a healthy person can walk to the local center. Based on this, they have proposed a radius of about 400 meters, which creates areas of about 50 hectares. Such a neighborhood unit does not intend to be seen from the outside, so neighborhood units must be

connected to each other through a continuous network of urban movement.

The third category includes definitions that do not emphasize quantitative characteristics such as population, size, and density, but the main elements in defining the neighborhood unit include proximity, local communication, participation, political control, physical and social characteristics, residents, and so on.

The fourth category includes the definition that provides the neighborhood unit based on its basic-spatial characteristics. Accordingly, the Neighborhood Unit is one of the basic spatial features in relation to the groups of inhabitants, sometimes in relation to other uses of the earth.

In the fifth category, the classification of definitions is based on the application of two different social and ecological perspectives.

### **Crime prevention through environmental design (CPTED)**

According to this theory, urban designers and planners, with their knowledge and experience, design and plan urban planning to reduce the fear of crime and reduce the potential for violations (in the environment) according to the capacity of the environmental construction. In the book titled "Death and Life in Big American Cities," Ms. Jacobs believes that the street factor is more important than any other factor in creating urban security: "If the city streets are safe from savagery and fear, the city is safe from savagery and fear. When it is said that the city is dangerous, what is essential is that there is no sense of security in its streets ". According to Ms. Jacobs, factors such as bright and crowded places with keen eyes, high public participation, and large enough sidewalks are effective in shaping a safe urban environment and offering a variety of uses for city streets (Rezazadeh and Khabir, 2010).

#### **Basic principles of CPTED approach**

##### ***Natural access control***

With this principle, access to crime-prone areas in the city can be reduced for potential offenders. For this purpose, it is possible to use the passages and access routes under the supervision of citizens and pedestrians or residents, which is possible by clearly defining the entrance and exit of residential buildings in urban sites and the type and method of lighting and natural monitoring of access to the site (Ghurchi Beigi, 2007). The realm separates private spaces from the public and is formed on the basis of the sense of private ownership, which is made possible by strengthening the sense and spirit of ownership in constructed and artificial environments (Ghurchi Beigi, 2007).

##### ***Repair and maintenance***

With proper maintenance of urban furniture and urban signs and lighting and landscaping lights, in

addition to optimizing urban costs, it is possible to reduce the capacity of areas in crime occurrence (Ghurchi Beigi, 2007).

##### ***Natural Surveillance***

- Means the empowerment of the urban environment through exposure and easy monitoring of urban areas
- Enabling public view of urban areas
- Preventing the creation of uncontrollable areas or blind areas (Ghurchi Beigi, 2007).

##### ***Supporting community activities***

This means that in addition to creating jobs and welfare facilities, it is made possible to increase the level of human supervision over the regions. Many urban crimes occur in areas where public oversight is low or people are not physically present. In this method, an attempt is made to provide some kind of empowerment in social activities, and in fact social activities and the presence of individuals are added to urban areas, especially in areas where crime is more likely (Ghurchi Beigi, 2007).

#### **Definition of high-rise construction**

High-rise construction is a phenomenon in the world that has been recorded since the late 19th and early 20th centuries, and the first steps in the production of skyscrapers were taken from about 1880 to 1900 in Chicago.

The last decades of the nineteenth century have been marked by the beginning of the general growth of high-rise construction in the West. Although the high-rise construction phenomenon has always been criticized by various thinkers in social, economic and urban planning issues and its application has been viewed with skepticism, but it has always been able to prove its permanent presence and add to its field of activity.

On one hand, this phenomenon can answer many urban issues such as land scarcity, housing shortage, speed in construction and focus on utility networks, and so on; but on the other hand, it creates other problems and shortcomings. In other developed countries, attempts have been made to take advantage of the benefits of high-rise construction and to control the issues and problems arising from it, in accordance with applicable laws and regulations, and to control the phenomenon. In this effort, our cities are currently witnessing the growth and expansion of high-rise buildings, and this is happening at a time when there is no proper understanding of the importance of the issue and controllable laws and regulations are not available (Sadoughian, 1992).

#### **Definition of the high-rise building limit based on its height limit**

One of the criteria for determining the height of a tall building is the availability limit of firefighting equipment, which varies according to the standards mentioned in the laws of different countries. In Iran, according to the

publication No. 112 of the country's Management and Planning Organization, the definition of a tall building is as follows:

"Any building with height (vertical distance between the floor level of the highest floor to be used and the lowest accessible level for firefighting vehicles) more than 23 meters is considered a tall building."

#### **Definition of high-rise building according to its characteristics or location in the city and region**

This type of definition is based on the characteristics of the building and its location in the city. One of the definitions in this regard is as follows:

A tall building is not specifically defined by the number of floors or its height, but the important feature of these buildings is that the design or function of the building is influenced by a symbol of height.

According to the Council on Tall Buildings and Urban Housing in the United States, without specifying the height or number of floors, a high-rise building is one that significantly affects one aspect of space use or construction planning. Compared to conventional buildings, these buildings require special rules and regulations in design, planning and construction. Buildings above 12-stories are considered high-rise in the American Urban Planning and Design Standards.

According to the definitions provided, the criteria of the first type can be changed over time, for example, the height of fire ladders changes with the improvement of technology. For this reason, this definition is less acceptable. The definition of the second type seems to be more practical and acceptable due to attention to the characteristics of the region and the location of tall buildings in different cities (Part Consulting Engineers, 2015).

#### **Basic categories related to high-rise constructions**

##### **1- Economic effects**

A) The effect of tall buildings on building density and land use

B) The cost of tall buildings construction

C) The effect of tall buildings on land use)

##### **2- Social effects**

A) Lack of harmony, proximity of cultures in high-rise buildings

B) Lack of proximity and settlement of social, ethnic, national and racial groups in high-rise buildings

C) Lack of compatibility of high-rise buildings with population density and households

D) Economic and social incompatibility of households

E) Security of buildings

R) The issue of unexpected events such as earthquakes, winds, fires

G) The identity issue

##### **3- Climatic and environmental effects**

A) Air and environmental pollution

B) The state of light and sun

#### **History of high-rise construction in the world**

Until the 19th century, high-rise buildings were limited to shrines, pyramids, castles, amphitheaters, mosques, and churches that symbolized power and faith. In ancient Rome, tall concrete structures were used in the construction of high-rise buildings, the best example of which is the famous Pantheon in Rome.

With the beginning of the 19th century, the metal structure gradually replaced the heavy building structure in the construction of multi-storey buildings. At the same time with the industrial revolution which brought about urbanization and the rapid growth of population, the construction of housing became widespread. Technological progress would not have been possible without scientific growth; so the first technical university was founded in 1747 in Paris. The invention of elevators removed the height limit of the building to 5 floors. The first safe elevator was introduced by Elisha Otis in 1854 at the New York Show.

#### **Background of high-rise construction in Iran**

The year 1328 AH can be considered as the beginning of high-rise construction in Iran. Until 1949, the Afsaran Club building can be considered as the tallest buildings in Iran and Tehran, which consisted of four floors. Iran's first tall building was built in Tehran at Jomhuri Street in 1949-51 with 10 floors. Then in 1950-62, Plasco buildings were built and two years later, in 1952, 13-story aluminum commercial building was constructed. With the advent of the Islamic Revolution, high-rise construction was halted for almost 10 years. During these years, the construction of this type of building was limited to the completion of semi-finished residential complexes. In recent years, the trend of high-rise construction has grown significantly in Iran (Sadoughian, 1992).

#### **Investigating the relationship between high-rise buildings and security**

##### ***Vision and perspective***

One of the effects of high-rise construction, which advocates always refer to as a significant advantage, is to provide the desired landscape from within the high-rise to various urban landscapes. But on the other hand, these buildings block the view and landscape of other buildings, and this is directly related to security in public spaces. Adding the "street eyes" element (public space surveillance) to planning and design creates opportunities for inconspicuous care of places where crime may occur. People feel more secure when they are in sight or being heard.

##### ***Security***

Security is one of the most basic needs of a person, it has various aspects, some of which are reflected in architectural spaces and is a criterion for evaluating and



improving the quality of architectural space. Modern materials are more effective than traditional materials in improving the security of life in physical, mental and economic aspects, resulting in a healthy person, a healthy family and a healthy society. Complete provision of physical needs (physical health, proper housing, vehicles, amenities, adequate income, etc.) brings comfort, and full supply of mental needs (comfort, mental health, sense of belonging and so on) brings peace. If there is no comfort, there will be no security.

#### ***Building lighting (creating a sense of security)***

From a designer's point of view, daylight design is very sensitive and important because the building's façade is the first part which creates a connection between the building and environment, but lighting of a building at night is more sensitive and difficult, because even a very ordinary building can become a tourist attraction at night, or a very beautiful building can become a horrible sight on the night scene. Excessive lighting due to the presence of screens creates a relative security and, more importantly, a sense of security in passers-by, so that people are not frightened in the last hours of the night and feel comfortable.

#### ***Vitality***

Diversity is one of the factors that create vitality. Different areas have different characteristics, activities, sizes, uses, and functions. Some places are lively and crowded and others are quiet and remote. The sidewalks, where no vehicles are allowed to pass, also provide a visual-free space that fits human environmental perception and enhances security.

#### **Human scale and security in urban spaces**

In the narrow streets and small spaces, one can see the buildings, details and the people around from a close distance. There are many things to imitate, many buildings and activities, and human beings experience them with great intensity and see the scene as being warm, private and desirable. In places where built areas are large-scale and scattered, there is generally a lot to experience, and senses that rely on strong, intense emotions have absolutely no use. The study of spatial proportions in old cities with traditional design reveals a similar pattern from one city to another. The street width of 3.5, 8 or 10 meters easily accommodates the flow of 2400 to 7800 people per hour, and the squares are often close to the magical dimensions of 40 \* 80, which means that people passing through the space can percept the whole scene by viewing the square and other people's faces (Moghaddasi, 2014; Sergievskaya et al., 2018).

#### **CONCLUSION**

The security of urban spaces plays an important role in improving the social welfare of citizens. Based on what was stated in the CPTED theory, it is possible to control

the behavior of citizens in a specific spatial framework, and reduce the occurrence of criminal behavior in an urban environment. In general, in a two-way interaction with his living environment, man not only adjusts his physics in line with the physics of the environment, but he is also influenced in some way by his behavior in the physical environment.

By examining the components of mental and physical comfort that are effective in social sustainability in residential areas, especially by emphasizing on the impacts of high-rise buildings, we achieved the following results which guide through reaching security in this area:

- The level of public space surveillance on planning and design creates opportunities for intangible care in places where crime may occur.
- Criteria can be developed for the application of painting, in accordance with the performance, culture and location of tall buildings.
- In addition to proper color and facade, proper lighting can also greatly increase the security of people living in the neighborhood.
- Spatial proportions and human scale make people see their surroundings from a close distance and feel more secure when they are in space.

#### **Competing interests**

The authors declare that there are no competing interests.

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