Investigating the Design Indicators for Increasing the Security of Inhabitants in High-rise Residential Complexes in Tehran

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ABSTRACT: In the present century, the emergence of issues such as population growth, public demand for living or working in urban centers, increasing use of land have allowed for existence of high rise residential complexes necessary in most major cities of the world. Despite their benefits and advantages, high-rise residential complexes have also given rise to some limitations and threats and have greatly influenced the quality of urban life. Security is one of the indicators of life quality in cities and lack of sufficient attention to this indicator can lead to significant social harms. Considering the need for increasing security in the contemporary world, it is necessary to study security factors as well as the mechanisms that seems necessary. The present study investigates the factors affecting the security of inhabitants in High-rise residential complexes in Tehran; library studies was used for data collection in the theoretical part of the research and the design indicators such as location and general form of building, controllability of the spaces, guarding and electronic methods, and the use of the guard and the fence, were categorized in order to increase security. Finally, these factors were analyzed in two residential Complexes in Tehran (Vanak Park and Saman). For analyzing the case studies, documents, existing maps, field observations and interviews were used, comparing, and eventually presented in five qualitative sections of a statistical table. The findings indicate that visibility and surveillance play a major role in increasing the security of residents in high-rise residential complexes.

Keywords: Security, High-rise Residential Complexes, Tehran.

INTRODUCTION

Security is a social issue that has always been taken into account by managers, planners and urban designers. Paying attention to security as one of the basic needs of citizens will decrease anomalies and urban problems.

Today, in planning and designing residential complexes new approaches that pay particular attention to human and environmental aspects in design, has attracted enormous interest. Environmental security and individual safety are two important factors that have direct impact on the design and planning of residential complexes. In addition, the physical environment has significant influence on the number of crime acts. Life quality could be enhanced by taking all these aspects into account during environmental graphic design and consequently improving the level of health and safety.

In the present study, security is defined as protection of building and its inhabitants against vandalism, crimes such as robbery, harassment, anti-social behaviors, and similar factors that affect the security of residents. In this study, attempts are made to investigate the effective design indicators in increasing the security of residents in high-rise residential complexes. These indicators include the location and overall form of buildings, visibility and surveillance, electronic safeguarding techniques, and the use of fences. Moreover, attempts are made to answer the following questions to achieve the goal of the study: What are the most effective indicator(s) for increasing the security of residents in high-rise residential complexes in Tehran?

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RESEARCH METHODOLOGY

The present paper is a qualitative descriptive study. Library and document studies are used to formulate the theoretical framework of the study, and then attempts are made to evaluate and examine two hypotheses in two residential complexes located in Tehran. The samples are selected based on the information obtained from relevant references. Saman complex with a higher level of security and Vanak Park complex with a lower level of safeness were finally selected as the case studies. In the present study, the two above mentioned complexes are investigated to find the most effective security indicators among the hypothesized indicators.

THEORETICAL FRAMEWORK

The Concept of Security

The word security is derived from the Arabic term "Safe" that means safety, immunity from danger and fear (Ashouri, 1994, p. 38). Dictionaries define the concept of security as: state of being safe, relaxed and comfortable, protection against danger, feeling free from fear, feeling safe and free from threat (Hatami-Nejad et al., 2013, p. 68). Security is the guarantee of life by taking the necessary measures. Security means creation of shelter for life. Moreover, security is a supportive and protective measure that brings about comfort and ease of mind (Dari Pour & Maleki, 2009, p. 29). In fact, based on Abraham Maslow's pyramid of human needs presented in Fig. 1 that is one of the most recognized classifications in this field, "safety" and "security" are the second human needs following the physiological needs. (Salamati Zare, 2014, p. 6). In case this human need is not met, the higher human needs such as the need for love, the need for respect, will not be met, and humans will not be able to meet their most noble need, which is self-actualization (Pakzad, 2005, p. 33).
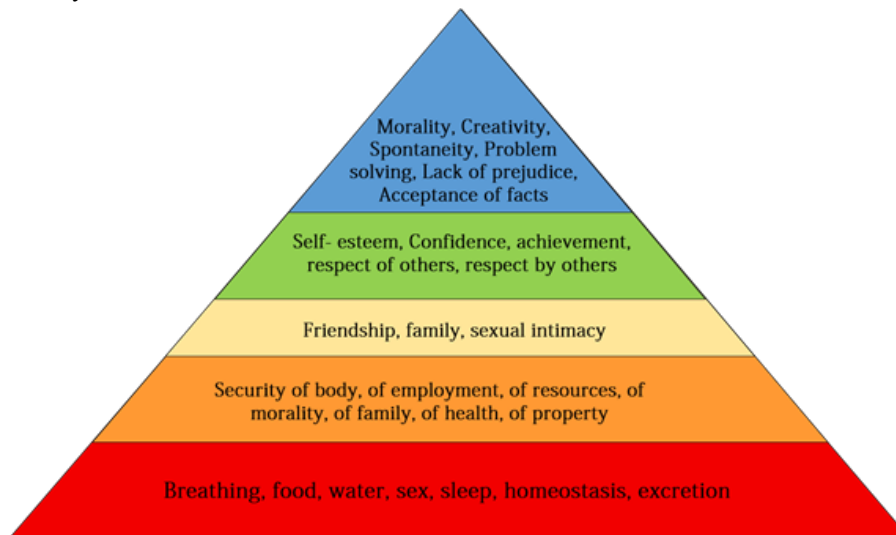

Fig. 1. Maslow Pyramid - hierarchy of Human Needs (Maslow, 1954)

In description of security, two distinct dimensions must be taken into account: the objective dimension where the environmental and behavioral parameters are evaluated, and the subjective dimension that is recognized based on the collective sense of security. Both dimensions can have positive or negative effects on each other, and this shows the necessity of focusing on both dimensions to achieve public security. Also, according to the aforementioned points, the distinction between safety and security could be described as follows: Safety is mostly concerned with human health and the prevention of threats that could endanger human health. Indeed, it includes tangible and external security. However, security is mostly a subjective phenomenon. We need to seek the factors that create a sense of security in the society and find ways to consolidate it. Accordingly, security is a kind of inner feeling of tranquility and comfort that is derived from the active environmental components and creates a sense of safety after it is subjectively perceived (Moayedi et al., 2013, p. 166).

Safeness in High-rise Residential Complexes

Increasing population density can have positive

and negative effects on the security of residents. The concentration of attendants can lead to potential discomfort and harassment on the one hand, and increase the possibility of control and surveillance over anomalous social behaviors (Rezaei Moghadam et al., 2012, p. 81). Hence, residential complexes need to be designed consciously to guarantee the security of residents by providing them comfort. Security of high-rise residential buildings is provided in view of their characteristics. In general, protection is based on two basic principles: - development of boundaries and fences against unauthorized entry of people and practice of surveillance measures by the guards; creating surveillance opportunities for residents by designing defined and specified spaces; or through Electronic Methods (Talebi, 2012, p. 172). According to the investigations conducted in the present study, security factors are classified into two categories: active protection and passive protection, each of the above-mentioned factors is divided into sub-branches that will be discussed below:
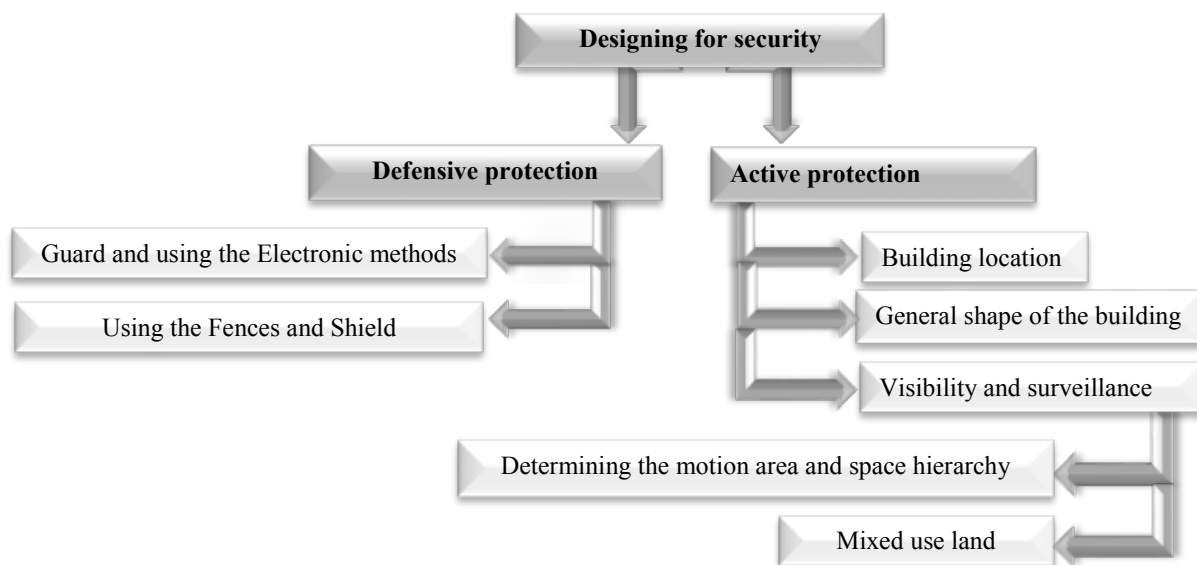

Fig. 2. Designing Indicators for Security

Active Protection

Creation of security should be one of the human-environmental goals in any complex design process. Proper design can pave the way for provision of space conditions that lead to prevention of any criminal act. Meanwhile, the control of neighborhood residents over all activities performed in the neighborhood can play an important role in this process (Rezaei Moghadam et al., 2012, p. 19). Active protection is actually the design of spaces in such a way that can deprive the opportunity of any criminal act, for example, safe design methods that meet the security needs of residents without incurring high costs.

Location of High-rise Residential Complexes

One of the factors that may contribute to reduction of crime rate is the proper location of buildings in such a way that doesn't exacerbate insecurity but prevents criminal

activity. The consistency of buildings with neighborhood in such a way that the exterior parts of the building comply with the standards and architectural features of the neighborhood and a proper relationship with the adjacent roads and motorways can also contribute to creation of security. Improper analysis of access to roads or improper location of the building will allow criminals to take advantage of the opportunity to commit a crime and escape quickly. Location of building on a main street or in the vicinity of motorways with cars and motorcycles in particular, which are potential sources of danger, can create insecurity. Knowledge of the use of surrounding buildings and their users, as well as the level of traffic and noise can help identify the features of the surrounding areas and consequently contribute to proper and secure design of the buildings. Oscar Newman also believes that establishment of residential units near commercial and social facilities can effectively increase security.

General Shape of the Building

The physical form and characteristics of the building should not hide any space from the residents' sight and must prevent the ground for vandalism. With proper shapes and volumes, designers can create entrances with specific uses that will have a significant effect on the security of the residents. The juxtaposition of dwellings—their entries and amenities—with city streets and the adoption of building forms and idioms that avoids the stigma of peculiarity, compared to other neighborhood buildings, are among the solutions presented by Oscar Newman to enhance security.

Parking

In case the building provides an open parking lot space, this space should be small and adequately visible from the building side and also enjoy suitable lighting. Many of the problems in residential complexes are associated with the location of the parking lots since most crimes such as robbery and vandalism occur in such areas. There should be an immediate and straight access route between the parking lot and the entrance door. Moreover, this route should be controllable and enjoy adequate lighting (Fig. 3).

Fig. 3. Controllable Parking

Escape Routes

In building design, the escape stairs should always be located in sight and in a controlled space. In order to prevent the escape of offender through the staircase, escape doors should not provide access to intermediate floors through the staircase. In other words, people who enter the stairway, should only be able to exit the building through a controlled space on the first floor.

Visibility and Surveillance

In his book "Death and life of great American cities" Jane Jacobs, the great urban theorist, put forward the concept of "eyes on the streets" to increase the security of environments (Alimardani et al., 2017, p. 16). The spaces around the building, such as the yard and public spaces, and even the spaces inside the building, should be visible to the residents. Crowding is one of the problems in residential complexes that makes it impossible for residents to identify all the people. However, unauthorized entry into and out of the building can be prevented in some ways. The building should be designed in such a way that it can protect itself and help the residents control

it. In other words, the building should boost the sense of territoriality, because people need to delineate their territory and defend it. Oscar Newman proposes level changes, floor changes, keys, decorative entrances, etc. in order to increase territoriality.

"Defensible spaces" are spaces where people have more activities, feel more secure and rarely allow for criminal activities. If we divide existing spaces into two categories of indoor spaces and open spaces, the so-called indoor spaces must be characterized by protection of privacy and isolation. On the contrary, the outdoor or open spaces should serve as an area for social interactions, exposure to the public and spaces that can be equally experienced and accessed by everyone for a healthy lifestyle (Dari Pour & Maleki, 2015, p. 28). Proper design can encourage people to feel responsible for their residence spaces. Building design can provide them with a positive mental image of their place of residence and offer privacy and identity, and finally play an effective role in increasing the sense of security in residents. For example, people should regard public and semi-public spaces (with different uses that are designed to strengthen neighborhood communications) as a part of their living

environment to determine which space belongs to specific groups and prevent problems caused by distribution of age groups, vandalism, the unauthorized entry of aggressors, and the failure of facilities and equipment.

During the development of defensible spaces, reduction of the number of buildings to be constructed within a given plan zone is of vital importance (Fig. 4).

Fig. 4. Visibility and Surveillance

Visibility and surveillance of spaces can be enhanced in the following ways:

Determining the Motion Area and Space Hierarchy

According to Angel, leading the confused traffic to specific routes is one of the solutions proposed to enhance security. The wide area of the building site as well as the surrounding areas should be divided into different parts, so that each part can be controlled by a number of residents. In order to control the traffic of individuals, the designer must define and specify spaces with clear hierarchy that cover public to semi-public, semi-private and finally private areas in each unit. Transient and hierarchy changes can be specified by means of symbolic and real obstacles, floor texture changes, surface level changes and development of landscapes, so that people can recognize the building territory from outside and these hierarchies can act as a filter to limit and control the entry of individuals (Fig. 5).

Fig. 5. Determining the Motion Area and Space Hierarchy

Mixed use Land

Jane Jacobs has emphasized on vitality of space as an effective factor in creating a secure and successful environment. She believes that the use of streets by most people creates more opportunities for informal monitoring, which will in turn prevent criminal activities (Alimardani et al., 2017, p. 18).

Angel also believes that a more frequent use of some parts of the city would increase the number of observers and witnesses, which could have a direct impact on the reduction of crimes.

The mixture of some land uses including the mixture of stores, offices and apartments in a given site, a mixture

of land uses in neighboring units, blocks and buildings, the mixture of multi-family and single-family households, and the diversity of people in terms of age, social class, culture and race, can have the following functions:

1. The presence of different strata at different times.

2. Overcoming the seclusion and spatial isolation problems as a frightening factor for users and an opportunity for criminals. 3. Inclusion of activities with insecurity potentials within safe areas and within the activities with higher surveillance potential and vice versa. 4. Development of a sense of vitality in the environment and reducing the flatness of the land use location criteria (Yousef pour et al., 2015, p. 5). Division of spaces into smaller parts allows for better social surveillance and providing the ground for different activities within these parts can lead to creation of lively and active atmosphere and environments that enjoy a high level of safety and enable people to get help from others in case they are

in danger. The designer can encourage residents to use specific spaces within the building site by changing the surface texture, using different ground levels, designing the area, playgrounds and sociable spaces, and provide care, protection, and ultimately a sense of security for the residents. Attempts should be made to illuminate deep shadows by natural or artificial light in all these public spaces to prevent optical illusions, and help residents overcome their fear of darkness when entering and exiting the building, so that they can be provided with a favorable spatial experience at different hours of day and night; and crime insecurity can be prevented and minimized at the same time. The windows should predominate pedestrian routes, public spaces and adjacent streets and meet the interior design requirements at the same time, so that they can play an effective role in development of a sense of security (Fig. 6).

Fig. 6. Mixed Use Land

Defensive Protection

This kind of protection leads to the development of a barrier between the interior and exterior parts of the building. The barriers include safe grilles, special access methods and locks (Rezaei Moghadam et al., 2012, p. 8). Defensive protection includes reinforcement of spaces designed to prevent unauthorized entry of people and maintain security.

Safeguarding, Surveillance Cameras and Electronic Methods

It is not possible to create a sense of security using the principles of environmental design alone. This holds true especially for high rise buildings due to their structure and plurality of units and floors that do not allow all residents to have control and surveillance over public spaces, and many spaces such as the staircase and the elevator are completely invisible for them. Therefore, a number of controllers and reinforcement elements should be used

for surveillance purposes in such buildings. For example, the main entrance should be equipped with security controls such as security guards and CCTV cameras. Electronic methods enable the residents to monitor the interior and exterior parts of the building, with the help of television screens from the corridors and elevators and floors; residents will be able to supervise the children and the people who enter the building. Electronic equipment, such as alarms allow residents to communicate with guards and police. By playing a number of roles including monitoring, protection and surveillance of the yard land, reporting irregularities to residents, controlling vehicle and individuals' entry and exit, the guards help to establish a safe environment for residents of high-rise complexes, and in many cases act just like the police.

Installation of Fences, Grilles, Anti-theft Doors and ...

One of the most important elements of the building design is installation of fences, grilles at the entrance

to the building's area, to delineate the building area and indicate that these spaces are not public and belong to the residents. The following guidelines are recommended for walls, fences, grilles and etc.

1- The boundary walls near the window should be designed in such a way that people cannot sit on them.
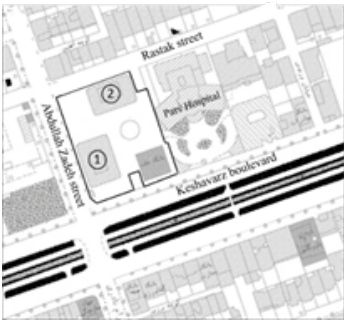
2- Wherever privacy is less important, the existence of a personal public space is essential; a simple short wall, with fence and grilles can be sufficient. 3. Hinges or fences should be of ascend-descend type so that they can be easily used for protection. Some fences or temporary protections may be necessary to create an obstacle before the hedge ascends sufficiently (Colquhoun, 2008, p. 157). Windows provide a way for entry into the building, therefore some security features such as the installation of protection fences and steel grids should be followed to prevent glass break and window unlocking. The building includes some openings and holes with access to the utility channels as well as openings that allow light and air into the underground space, etc., therefore they should be protected and constantly monitored. The use of real or symbolic enclosures to control spaces is one of the ways Oscar Newman has proposed to enhance security.

CASE STUDIES

According to the studies and the results obtained, active protection and defensive protection are assumed to be the two factors that enhance the security of residents in high-rise residential complexes. Active protection includes: attention to the location of the building, the overall structure of the building, and the visibility and surveillance of the spaces which is divided into two categories: determination of the traffic zone and the hierarchy of space, and mixed land use. And defensive protection includes the use of electronic safeguarding methods, as well as grilles and fences. The evaluation of hypotheses in different case studies and the results obtained indicate the most effective design indicators for the security of residents in the studied buildings.

According to the title field two case studies, Vanak park residential complex and Saman residential complex were investigated. These complexes are briefly introduced in Table 1. The Case studies have been selected with the help of relevant authorities and entities. According to reports, Saman and Vanak Park residential complexes enjoy high security and low security levels respectively.

Table 1. Vanak Park and Saman Residential Complex

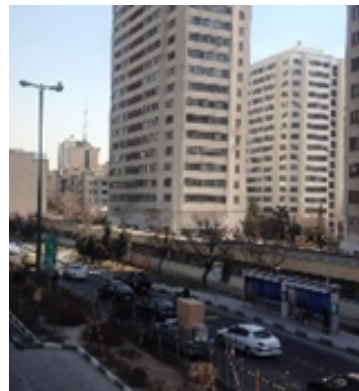| Tower Name	Specifications	Site Plan	Images
Vanak Park	Vanak Park residential towers, Abdulaziz Farmanfarmayan's plan, it includes five towers, two24-floor towers with four units in each floor located in the north of the site (Sahand and Sabalan) in1985 and Alborz and Damavand, which are 15 floors of six units and they were constructed in 1988 and Alvand Tower with 17 floors of three units was exploited in 1994. Van Park has a total of 440 residential units with a population of about 2000 people and 111 commercial units and 27 office units which is located in an area of 4 hectares in the sixth district of Tehran municipality. It is connected to the Shahid Hemmat highway from the north and it is connected to the Sheikh Baha'i street from the west.	1. Sahand 2. Sabalan 3. Alborz 4. Alvand 5. Damavand	
Saman	Saman twin towers, Abdulaziz Farmanfarmayan's plan, located in Keshavarz boulevard, it is the first high-rise residential building in Tehran which has been exploited in 1970. This residential complex is located in the 6th district of Tehran municipality and it is consisted of two blocks of 22 floors, each with three floors of parking and commercial units. The first block has more foundation than the second block and each floor has between three and seven units which have a total of 200 residential units.		

DATA ANALYSIS

In order to examine the hypothesis, the indicator was investigated in the selected sample groups. This study began with investigation of drawings and documents and continued with field surveys, interviews with a number of randomly selected residents, as well interviews with the manager and the complex employees. Studies were conducted in parallel, and then the researchers assigned a mark to each indicator in each residential complex; this mark included one of five qualitative levels. Investigations continued in order to find out the reasons for higher security levels of the Saman compared to Vanak Park according to the indicators, and finally the result was presented. The results reveal the strengths and weaknesses of each complex according to the design indicators in the following table. The table is based on the data presented in the theoretical foundation section of the study.

Table 2. Evaluating the Building Location Indicator in Residential Complexes

Tower Name	Strong Points	Weak Points	Images
Vanak Park	The site entrances are connected to the Alikhani street in the southern part. It is a local street with the major residential uses and except the residents of this region, strangers do not use it to cross and access other locations.	It is located in the intersection of Shahid Hemmat highway and Sheikh Baha'i street, the Shahid Hemmat highway is the main passageway and Sheikh Baha'i street in the west of the complex is a very quiet street with a very small width for passing by pedestrians. In total, the Van Park site is located in the vicinity of the walking routes from all directions. Unused lands and unfinished buildings, including the Melenim building, are located in the vicinity of the complex site.	Shahid Hemmat highway, north of the site
Saman	It is the major uses around the Saman residential complex.	It is located in the intersection of the Keshavarz boulevard and Abdullah Zadeh street that both of them are walking routes and cause insecurity. In total, it is in the vicinity of walking routes from three directions. The routes which are passageways and strangers use it to access various locations, including Valiasr square. There is a hospital in the east side and in the vicinity of the Saman complex.	Intersection of the Keshavarz boulevard and Abdullah Zadeh street

Building Location

According to the results of different studies that are presented in form of strengths and weaknesses in Table 2, Saman and Vanak Park Complexes' score average and poor respectively in using this indicator is. This assessment shows that this indicator can be considered as one of the major factors that contributes to higher level of security in Saman complex compared to Vanak Park complex; however, according to the above-mentioned descriptions, it is clear that Saman Complex is not suitably located. Therefore it can be concluded that some other factor has led to higher level of security of the Saman Complex, or the location of Saman complex has nothing to do with higher level of security in this complex (Fig.7).
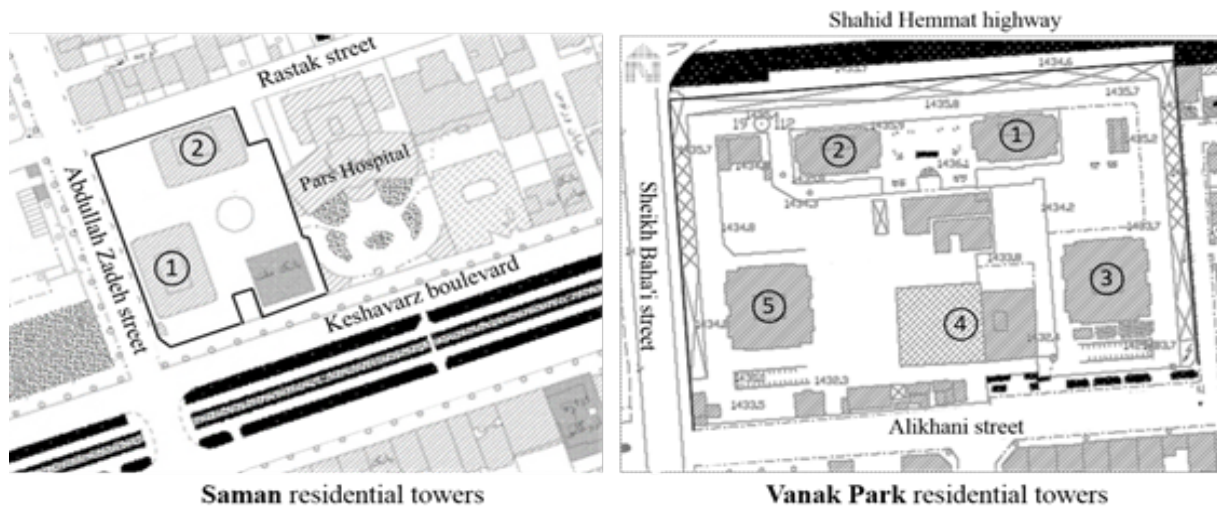
Fig. 7. The Location of Saman and Van Park Complexes

Building Location

Table 3. Evaluating the Indicator of the General Shape of the Building in the Residential Complexes

Tower Name	Strong Points	Weak Points	Images
Vanak Park	The general form of buildings is a simple cube without creating corners and hidden spaces and monitoring the exposed parking is possible for residents. The exit of the escape stairs are in the specified area in the site.	The height of the towers prevents the area from being monitored for the upper floors. Each unit monitors the site depending on its location and a number of units do not have the facility to monitor the riding and walking entrance to the complex site. This complex has 5 residential blocks and if generally considered, there are different spaces on the site that cannot be monitored by all units.	
Saman	The general form of buildings is a simple cube without corners and hidden spaces.	The large number of floors prevents the site area from being monitored by the residents of the upper floors.	

Due to their similarly in shape, and according to the strengths and weaknesses mentioned in Table 3 both residential complexes have score good in terms of overall shape. Therefore, the overall shape indicator cannot be

the reason for the higher security of the Saman complex as compared to the Vanak Park complex, because both of the complexes have a similar overall shape (Fig. 8).

Fig. 8. The General Building Form (Saman and Vanak Park Complexes)(www.googleEarth.com)

Visibility and Surveillance of Spaces

In order to analyze visibility and surveillance of various spaces such as yard land, parking lots and building site entrances by residents, the plan of units and direction of casement frames were investigated, then the study continued with field surveys of the complex site presented in Table 4 apart from the in-depth interviews. Finally, the assessment was accomplished by comparing the design indicators in the two residential complexes. The results show that Vanak Park and Saman complexes have obtained an average score and a good score in
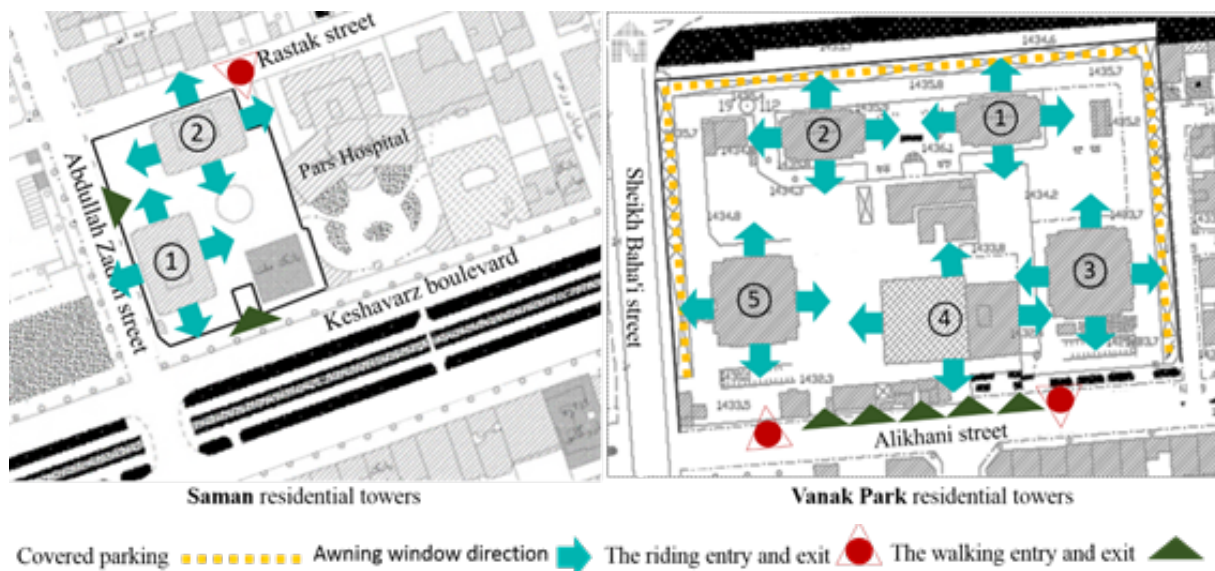
terms of design indicators respectively. Despite the use of design indicators that provide high potential for surveillance of spaces in Vanak Park complex, the vast area of the yard land and the existence of non-monitorable spaces (indoor parking, around the building site that have reportedly provided opportunities for frequent Car part thefts) have caused Vanak park complex to be ranked lower than Saman complex in terms of visibility and surveillance. Therefore, it can be argued that failure to attach enough importance to visibility and surveillance is one of the factors that has led to lower security of Vanak Park complex as compared to Saman complex (Fig. 9).

Table 4. Evaluating the Visible and Controllable Indicator of the Space in Residential Complexes

Tower Name	Strong Points	Weak Points	Images
Vanak Park	Space hierarchy, the existence of motion area and defined spaces in the site. Short routes, stair, plants, changing the texture of the pedestrian levels. The existence of public spaces such as fountain and its surrounding areas, sport grounds for the interactions of residents. The possibility of natural monitoring from the inside of the building on the external space according to the location of the unit in the complex. Considering the proper space illumination at night.	The existence of out of sight spaces and hidden corners in the site. The existence of usages on the ground floor of the towers that are open to the public and invite strangers to the courtyard at different hours of the day. The lack of specific and limited entrance and thus, the presence of strangers in the area. The large number of towers (5 towers) and finally, more inhabited population which makes the controllability difficult.	

Saman	The space hierarchy with the help of the entrance staircase from the street to the site. The site and the entrance of the complex can be monitored by the residents based on the unit location in the tower. The main entrance of the commercial unit is outside of the site. The small courtyard and the small number of towers (2 towers) are effective in controlling the complex.	The complex site is a space with small area without the defined spaces for different activities. Bank and coffee shop usages of the complex are the cause of the entrance of strangers to the site.	

Fig. 9. Saman and Vanak Park Residential Complexes Monitoring

Safeguarding and Using Electronic Methods

Vanak Park complex is ranked higher than Saman complex in terms of safeguarding and using electronic methods. These complexes have gained a good and average Safeguarding score respectively. Therefore, this indicator has had nothing to do with higher level of security in Saman complex compared to the Vanak Park complex (Table 5). Although, according to an interview, a number of residents expressed a sense of security due to favorable safeguarding and CCTV cameras, the use of this indicator has not led to any increase in the security of Vanak Park complex compared to Saman complex (Fig. 10).

Table 5. Evaluating the Indicator of Guard and Using the Electronic Methods in Residential Complexes

Tower Name	Strong Points	Weak Points	Images
Vanak Park	The existence of guard for controlling the riding entries and exits on the southern side. The existence of guard in the lobby of each tower to control the entry and exit of people and patrolling in the area at different hours in the site. Controlling the different spaces of the complex such as the indoor courtyard, lobby, parking and even elevators by the guards. Management and monitoring unit of the complex.	Parts of the site cannot be monitored by residents and there are not any cameras. There is not a guard for controlling the entry and exit of people to the main courtyard. Strangers walk to the courtyard in order to benefit from the existing usages of the complex.	
Saman	Monitoring different spaces like the site, parking and lobby and existence of bank utility in the site of the complex which helps the more monitoring and controlling of the courtyard with the help of cameras and police officers.	The main entrance of the site is not guarded.	

Closed-circuit television camera ○   Site guard ■   Tower guard ●
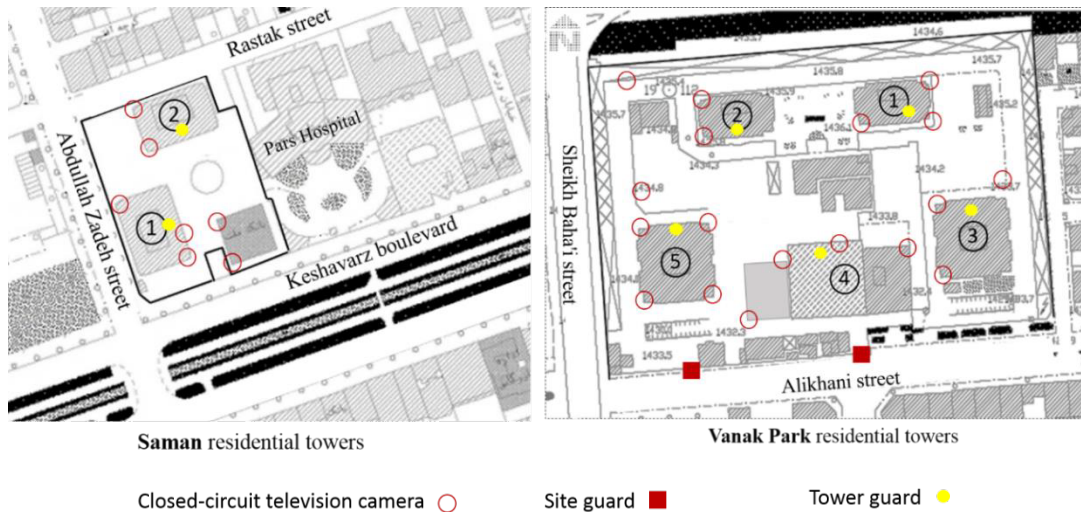
Fig. 10. The Location of Cameras and Guards in Vanak Park and Saman Residential Complexes

Use of Fences and Grilles

Vanak Park Complex is equipped with rigid and reticular fencing on three sides, on the south side, however no fence or grille is installed to prevent unauthorized entry into the complex site. Saman complex also has long walls all around it and the entrance of the site is equipped with metal fences that are short and easy to trespass. Having compared the strengths and weaknesses in using this design indicator in both complexes (Table 6), and the field observations and analyses, both complexes get the same score (average score) in this regard. Therefore, the

use of fences is not considered an effective indicator of higher level of security in Saman Complex or lower level of security in Vanak Park Complex (Fig. 11).

Table 6. Evaluating the Indicator of Using the Shield and Fence in the Residential Complexes

Tower Name	Strong Points	Weak Points	Images
Vanak Park	Constructing walls around the site which are latticed in its middle parts and they are covered with metal nets from the inside.	The absence of a shield and a fence in the middle part of the southern side of the site which does not define entry and exit spaces for the walking people.	
Saman	Constructing a long wall around the site and of course, in some parts, the commercial section of the complex acts like a shield for the site of the complex.	Existence of a short metal shield in the entrances of the site which will not be a fence for entering the strangers.	

Saman residential towers

Vanak Park residential towers
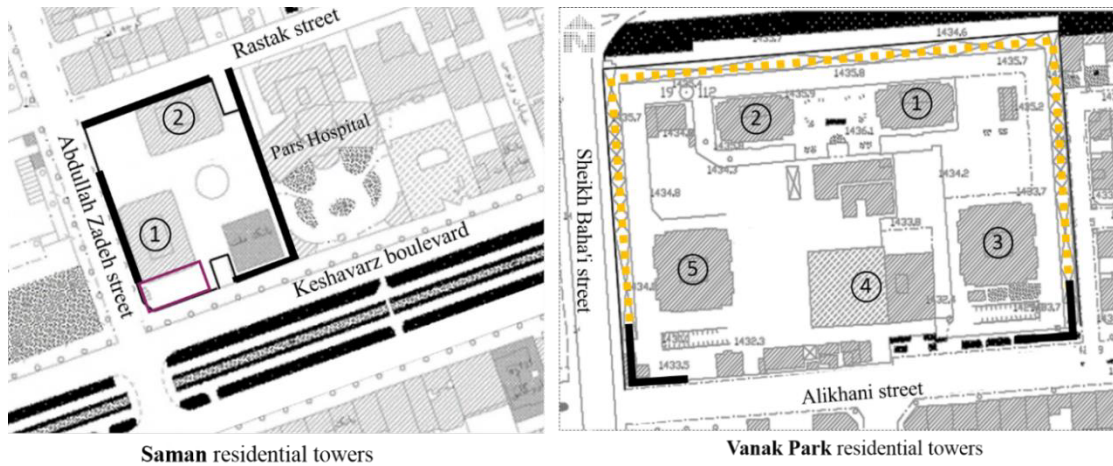
Combined lattice and rigid wall ▪▪▪▪▪▪▪   Rigid wall ▬▬   Commercial framework ☐

Fig. 11. The Status of the Shield and the Fence around the Courtyard in the Vanak Park and Saman Residential Complexes

SUMMARY AND CONCLUSION

In the present study, it was assumed that factors such as location of the building, the overall shape of the building, the visibility and surveillance of the spaces, determination of the traffic zone and the spatial hierarchy, as well as the mixed land use in the design process can play an effective role in increasing the security of residents in high-rise residential complexes in Tehran. Attempts were made to find the most influential indicator through library studies, field observations, analyses, and descriptions of the researcher and interviews with residents of the selected complexes. Table 7 show the score of the two complexes in terms of each indicator. The scores are based on the analysis performed by the researchers and based on the content presented in the theoretical foundation of the study. It is concluded that visibility and surveillance has a greater impact on the security of the residents, but the spatial hierarchy, the determination of traffic zone, and the mixed land use, which are methods for providing the ground for space surveillance, will be more effective when the complex site does not include any covered or invisible space. Despite the use of effective design indicators in Vanak Park residential complex, the existence of non-visible and non-monitorable spaces within this complex, as compared to Saman complex (which is built on a limited site and uses environmental design techniques to increase visibility and surveillance) has led to a lower security level. Now, according to the above-mentioned points, one can realize the importance of protective defense and surveillance of high-rise residential complexes in Tehran in enhancing the security of their residents. Therefore, due to the visual surveillance on the complexes site, criminals will definitely feel more afraid in the face of monitoring mechanisms. Hence, it is advisable for architects and builders of residential complexes to further focus on this indicator and its effects during the design process, as a key to increasing the security of residents.

Table 7. Final Evaluation of Using the Assumed Designing Indicators in the Residential

Residential Complex	Building Location	General Building Form	Visible and Controllable Space	Guard and Electronic Methods	Using the Fence and Shield
Vanak Park	Weak	Good	Medium	Good	Medium
Saman	Medium	Good	Good	Medium	Medium

REFERENCES

Alimardani, M., & Sharghi, A., & Mahdneshin, N. (2017). Investigating the Role of Security in the Vitality and Nightlife of Urban Public Spaces. *Quarterly Journal of Applied Arts.* (8), 15-26.

Ashouri, D. (1994). *Political Encyclopedia.* Tehran: Morvarid.

Colquhoun, I. (2008). *Design out Crime.* (M. Rayejian Asli & H.R. Ameri Siahoui, Trans). Mizan.

Danesh Pour, S.A., Mahdaviniya, M., & Ghiaei, M.M. (2009). Position of Knowledge of Environmental Psychology in High-rise Buildings with Sustainable Architecture Approach. *Journal of the City Identity.* (5), 29-38.

Dari Pour, N., & Maleki, S. (2015). Investigating the Role of Urban Landscape Component in Promoting Level of Citizens' Safety in Public Spaces of Ahwaz. *Quarterly Journal of Urban Landscape Research.* (3), 27-36.

Eynifar, A.R. (1999). Human Factors - an Effective Environment in the Design of Residential Complexes. *HONAR-HA-YE-ZIBA Journal.* (8), 109-118.

Hatami nejad, H., Mansouri, B., & Feli, M. (2013). Explaining the Role of Urban Spaces in Preventing Crime and Creating Security. *Quarterly Journal of Geographic Information.* (87), 68-76.

Izadi, M.S., & Haghi, M.R. (2015). Promote the Sense of Security in the Public Space by Utilizing Urban Design. *HONAR-HA-YE-ZIBA Journal.* (2), 5-12.

Jeason, S., & Vilson, P. (2008). *Designing out Crime, Crime Prevention through Environmental Design.* (M. Kalantari, & A. Salami Bearami,Trans.). Tehran. Applicable Studies Office, Prevention Police.

Lang, J. (2014). *Creating Architectural Theory.* (A.R. Eynifar, Trans.). Tehran. University of Tehran.

Mahboubi Manesh, H. (2001). Security and Social Deviations. *Journal of Strategic Women Studies.* (18), 133-159.

Maslow, A.H. (1954). *Motivation and Personality.* New York. Harper & Row.

Mirjamshidian, A., Nemat Zade, H., & Abaspour, S. (2016). Crime Prevention through Environmental Design. *Journal of New Research in Management and Accounting.* (4), 31-40.

Moayedi, M., Ali Nejad, M., & Navaei, H. (2013). Investigating the Role of Urban Landscape Components in Promoting the Level of Safety in Urban Public Spaces. *Quarterly Journal of Social Security Studies.* (35), 159-191.

Pakzad, J. (2005). *Theoretical Basis and Urban Design Process.* Tehran: Shahidi.

Rezaei Moghadam, A., Arezo, H., Yousef pour, V. & Ebadi, M. (2012). Investigation of Design Position in Creation of Sense of Security in Residential Complex. *Conference on Urban Planning and Management.*

Salamati Zare, A. (2014). *Urban Design in Contrast to Creating a Sense of Security in the Individual.* National Conference on Architecture, Urban Development and Sustainable Development with a Focus on Reading Iran-Islamic Identity.

Salehi, E. (2008). *Secure Urban Space Environment Features.* Center of Urban and Architectural Studies.

Talebi, J. (2012). *Architectural Design Guide of Residential High-rise Buildings.* Tehran. Road, Housing and Urban Development Research Center.

Yousefpour, J., Ghorbanalipour, A., & Samiei, A. (2015). *The Role of Architecture in Providing Security.* International Conference on Architecture, Urban Planning, Civil Engineering, Art, Environment.

Wortley, R., & Mazerolle, L. (2013). *Environmental Criminology and Crime Analysis.* Tehran. Applicable Studies Office, Prevention Police.

Zabihi, H., Larimiyan, T., & Pourani, H. (2013). Provide an Analytical Model for Promoting Urban Security through the Design Safety (SBD) Approach. *Quarterly Journal of Urban and Regional Studies and Research.* (17), 119-136.