Creative city design / Vol. 3, No. 2, 2020, 126-140

Practical Strategies and Smart City Solutions to Promote Women's Security in Public Areas (Case Study: Tehran District 16)

Ali Akbari[1*], Niloofar Lotfaliyan[2], Mahsa Hasanpour[3]

1.Assistant Professor, Department of Architecture, Art and Architecture Faculty, Yadegar-e-Imam Khomeini (RAH) Shahre Rey Branch, Islamic Azad University, Tehran, Iran
2. 3. Master of Architecture, Department of Architecture, Art and Architecture Faculty, Yadegar-e-Imam Khomeini (RAH) Shahre Rey Branch, Islamic Azad University, Tehran, Iran.

Submit Date: 2020-12-22, Accepted Date: 2021-05-09

ABSTRACT

Having sense of security in urban public areas is a concept that is considered as one of the highest values in the value hierarchy by citizens. This issue would be more critical in the poor areas, and therefore the role of urban design and the application of urban smart solutions for reducing problems would be more important and necessary in the mentioned areas. District 16 of Tehran is one of these critical areas. In this research, the philosophical paradigm is interpretivism and therefore the research approach is qualitative. This study is based on the cross-sectional survey research method. Data collection was done through direct observation of researchers and interviews made posing open-ended questions. Based on the descriptive analysis method, to clarify the type of strategies, the collected data were scored according to the AHP method. According to the results, from among the environmental factors, pollution of sidewalks and pedestrians is the most important factor that effects on women. The second most important factor is the abandoned empty lands in the era; the most serious problem with such places is the gatherings of addicts over there. Emptiness of the urban spaces and lack of suitable furniture have prevented women from using the spaces, and this has led to the genderization of the spaces. Inadequate lighting is another challenging issue in those areas. From among the functional factors, lack of public transportation during the night can be named as an important lack; Accordingly 11 strategies is proposed for smart city management , so as to reduce some of the challenges and to improve sense of security among women in these areas.

Keywords*: smart city, sense of security, women in urban security, presence in urban spaces, city planning*

1. INTRODUCTION

Having Sense of security in urban public areas is a concept that is considered as one of the highest values in the value hierarchy by citizens. Security has always been one of the critical needs of people and is highly correlated with life satisfaction (Rush, 2014).

In cities, the concept of social security and citizens' sense of security is recognized as a key element in achieving residential satisfaction. Sense of security enhances the comfort and well-being of citizens, and also the acceptance of commitment and responsibility among them; meanwhile, the feeling of security is somehow more important among women, owing to different reasons, but mainly because of women's role in the family and society.

*Corresponding author:
akbari@iausr.ac.ir

According to Jane Jacobs (Jacobs, 2016), the fundamental problem of insecurity in many parts of the city is not the presence of criminals or the poor, but the cities are not physically or better to say structurally able to provide security and vitality. In many cases, the urban structure leads to criminal behaviors; because the urban structure itself provides many opportunities for such deeds. Jeffrey (Jeffery, 1971), a criminologist at Florida State University, based on the rules of empirical psychology, proposed that eliminating city-wide crime boosters would increase the feeling of security (Atlas, 2013). Jane Jacobs' studies in the 1970s and 1960s led to the formation and development of the theory of crime prevention through environmental design. According to that, by using purposeful design of the man-made environment, architects and urban planners might reduce the fear of crime and improve the quality of life (Motalebi et al., 2016). This is one of the strategies and tactics of urban management and design in the large metropolises such as Tehran, which are immigrant-friendly. This issue is more important and necessary in the criminal areas.

In some areas of Tehran, due to various reasons such as social, economic and even commercial activities, there are more suitable conditions for the emergence and intensification of insecurity of citizens particularly for women; thus, and their living conditions are in some pars seriously problematic. This issue seems to be more critical in the poor areas; therefore the role of urban design and the application of urban smart solutions would be more important and necessary in the alleviation of problems. District 16 of Tehran is one of these critical areas that contains features as: massive crowds of inhabitants, lack of light or poor lighting, quiet and unobstructed streets, environmental pollution of the areas, quality of flooring, lack of nightlife possibilities, flooded passageways; these all lead to turmoil and irregularities that cause conditions that in which not only the balance of the urban environments is stirred, but also restrictions are imposed on the social behavior of residents especially women; that way women cannot easily spend time outdoors at nighttime; consequently, women's opportunities for social, economic and cultural activities as to working till late hours of the night would be limited, as a result these all in the long term get to women's dependency on men, and hence, a stereotypical view of women as weak and impotent gender is perceived. Therefore, it is necessary to provide models for urban development with an integrated view of all aspects of urbanization so that the present-day world's demands and expectations are met. One of these contemporary concepts for addressing these issues in the current cities in the field of urban planning and development is presenting smart solutions for urban environments. Providing smart strategies in the urban spaces that have many benefits for cities and inhabitants in many different economic, social, and environmental fields, This research seeks to promote the sense of security and attractiveness of women in public spaces, to provide a safe and secure environment for women and to identify factors that cause fear, anxiety, and stress in the environment, and eventually to have suggestions that can improve the quality of urban life and women's safety; in this connection,

2. Research method

In this research, from the ontological point of view, reality is not a material phenomenon and depends on the interpretation of researchers. Although reality is independent of researchers, it is socially constructed. Thus the philosophical paradigm is interpretivism and therefore research approach should be qualitative (Bazargan, 2019). This study is based on cross-sectional survey research method. As in survey research it can be used qualitative research strategies (Singleton & Straits, 2017) data collection was done through direct observation of researchers and interviews by using open-ended questions (Nobakht, 2017). In the stage of theoretical studies, data collection was done by referring to written sources such as books and articles. In the field data collection phase, among the women living in the area with a residence period of more than 5 years, 120 people of different ages from 16 to 70 years were interviewed randomly. After implementing the audio files, data was categorized and recurring categories were extracted to highlight strengths and weaknesses, opportunities and threats. After that physical and functional disturbances were extracted. In this stage, in order to clarify the type of strategies, it was necessary to score the identified problems to prioritize them. Based on the method of descriptive analysis, ten experts in architecture, urban planning and women's psychology were asked to give a score of one to ten to the components based on the pairwise analogy model. Then, the average scores were

entered in Expert Choice software to clarify the score of each index according to the AHP method. Based on the identified priorities, smart city strategies to solve the issue of women's security were described.

3. Literature Review

3.1. The Smart City

The smart city is a privileged place for the sustainable economic and industrial development in which issues such as traffic, consumption, pollution, updating and optimizing urban infrastructure, improving quality of life are dealt with through an innovative and systematic approach based on communication and information exchange aimed at optimizing urban management processes. Smart cities can enhance social interaction by using ICT and improving the security of the cities. Smart cities appeared as a tool for urban texture visualization.

The smart city is a privileged place for the sustainable economic and industrial development in which issues such as traffic, consumption, pollution, updating and optimizing urban infrastructure, improving quality of life are dealt with through an smart city reform: industry, education, partnership, technical infrastructure, various software factors; entrepreneurship and innovation. Table 1 provides some definitions for the smart city.

Table 1. Smart City definitions

Harrison et al., (2010)	A city which is connected to physical infrastructures, IT infrastructures and commercial infrastructures - to use of urban collective intelligence.
Chen (2010)	Smart cities utilize the advantage of communication and ability of sensors in urban infrastructure to optimize electrical transport and other logistics operations that support day-to-day living in order to improve the quality of life for all.
Washburn et al., (2010)	The use of intelligent computing technologies to establish sub-urban and municipal services such as: urban management, education, health care, general management, real-estate consultant, intelligent transportation and unified services.
Caragliu et al. (2011)	Every city is a smart one when investment on social capital, human capital, traditional and modern information technology, sustainable economic growth and a high quality of life through strategic management of natural resources through participatory governance, are provided.
Lazaroiu & Roscia (2012)	A society which possesses a modest degree of advantages of unified and sustainable technology.
Mohanty (2016)	Smart cities are a place where traditional networks and services are built using digital information technology and telecommunications to improve the operations and functions of the residents in a flexible place. Smart cities are more flourishing and friendly.

3.2. Smart city goals

A smart city is often defined through its goals; smartness is defined as more efficient, sustainable, fair, and livable (Alawadhi et al., 2012). The concept of smart city primarily ascribes to city as a system that has multiple subsystems. The subsystem functionalities as a whole ultimately allows it to act in a smart and coordinated way (Colldahl, 2013); in other word, the city represents a complex system of diverse and unpredictable interactions among its sub-systems. The goal of smart city is to achieve suitable solutions to manage this complexity, in particular by solving the negative consequences of global urbanization and higher quality of life for urban population (Nam & Pardo, 2011). The ultimate goals of the smart city are as follows: 1. Reducing carbon 2. Achieving energy efficiency 3. Communication and information technology in the development of specific industries 4. Achieving the most superior quality living environment for residents 5. Developing indoor green space Urban (Ojo et al., 2015: 43-67).

3.3. Smart City Dimensions

Komninos (Komninos, 2009: 337-355) introduces four dimensions to map out the characteristics of a smart city as:

1. The use of a range of digital and electronic technologies for a cyber, digital, informative and knowledge-based city.
2. The use of information technology to transform life and work.
3. The introduction of information and communication technology in urban infrastructure.
4. The direction of information and communication technology and people together to enhance innovation, learning and knowledge.

Gifinger et al., have identified four components for the smart city: industry, education, participation, and infrastructures (Albino et al., 2015: 3-21). At the Center of Regional Studies at the Vienna University of Technology, they mentioned six essential components for the smart city, which has been emphasized by many authors in this area.

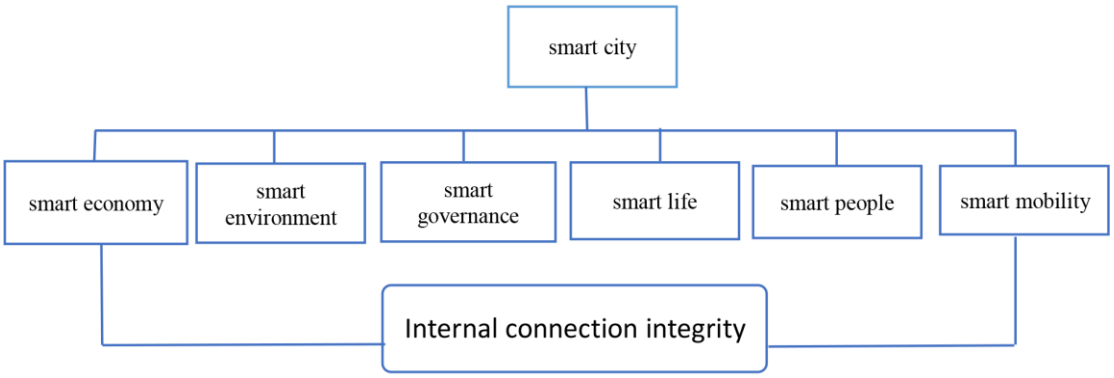


Diagram 1. Smart City Components (Giffinger et al, 2010).

3.4. Make Smart and Improvement of Quality of Urban Life

The importance of quality of life for individuals and efforts to promote that would be one of the most important principles of planning in each society and country. In the present time, the improvement of the quality of urban life has been accompanied by a dramatic increase in urban population; hence, obviously with the growth of urban amenities and services, the growth of urbanization can affect the quality of life. Increasing urban population growth which has been one of the characteristics of urbanization in recent decades, has, in many cases, moderated the impacts of urban growth and quality improvement on quality of life; whereas, reducing the per capita income of citizens from urban facilities, has maintained the quality of life in the cities; even in some cases, the current challenges have been raised in the urban community. It is a modern understanding with the highest quality and service of indicators and life factors. City smartness is a new idea to enhance and to improve the quality of life through the use of information and communication technology.

3.5. Security

Secure or security in term of terminology means a lack of apprehension; that is, a literal meaning of released from danger, threat, harm, anxiety.

The concept of security refers to the defense or self-protection of family, friends and properties. In the one hand, the concept of security in the urban spaces is related to the occurrence of crime and; on the other hand, it is related to the concept of being victim of crime. In the classification of the most fundamental needs that was carried out by Maslow, after positioning physiological needs, safety and security has been introduced as the second need. Predominantly, there are two dimensions for security: the objective dimension, which is evaluated with the objective parameters of the behavioral environment; and the other, subjective dimension which is understood based on the sense of security of being in community.

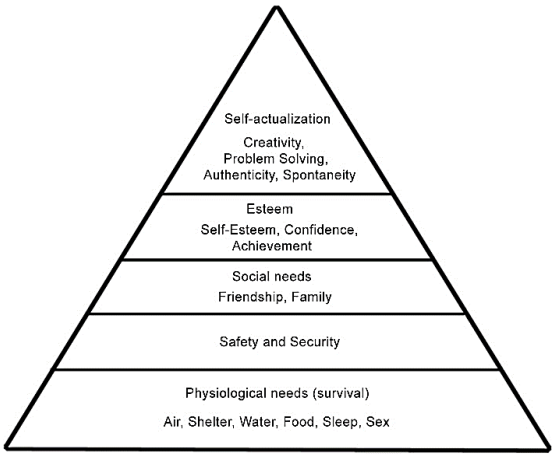


Diagram 2. The Maslow Hierarchy (Maslow, 2006)

3.5.1. Feeling of Security and its Characters

Sense of security in the urban spaces means that citizens might stay or move freely over the cities, ans alsi communicate with their friends and engage in social activities without the danger of being faced with physical violences. The sense of security involves the safety of citizens and also their properties, lives, and so on. Feeling of security is a subjective and not self-explanatory matter; it is based on the concept of being and not being in danger. The sense of security represents a process that flows over time and changes in time according to the prediction of the boundary. The mental aspect of security is more important than its objective aspec; Feeling of security while assuring one's knowledge, organizing his/her ontology of himself and giving him/her the foundation of existence.

Table 2. indicators, signs and consequences of Sense of Security

Indicators of security feeling	Signs of feeling safe	The consequences of feeling safe
Absence of visual harassment	Single presence in urban space	Feel the peace and comfort of being in the urban space
Lack of linguistic harassment	The presence alone in quiet hours in urban space	
No physical abuse	Not taking care of the gender of people occupying urban space	Continuous use of urban space

3. 5. 2. Security in Urban Areas

To create the sense of security and to safeguard the safety of spaces at different levels, various approaches have been suggested by international experts; each of the experts has somehow come up with the matter of secured urban spaces. There is a direct relationship between environmental security and readability; the more readability of the space and the principality of the environment designs, the more security would be provided in environment. The new environmental design guidelines emphasize that, with regard to the structure of urban spaces, the development and application of specific rules, could be widely used so as to prevent criminal offenses. One of the most important mechanisms of creating secure urban environment is to promote social incentives, to promote public monitoring along with the enhancement of public spaces, urban self-sufficiency elements, and to eliminate physical disruptions (Salehi, 2000: 107-114).

According to *Enhancing Urban Safety and Security: Global Report on Human Settlements* report which was published by UN, the place where crime occurs in, is more important than the question about who committed the crime ("Enhancing Urban Safety and Security," 2012). In order to create a secure and safe environment it would be necessary to identify the components of the urban safety. All factors might be divided into the following groups: natural, architectural, social, environmental, technogenical, infrastructural and urban; Urban factors include the development of the urban area and the territory utilization according to its function, the compliance of the territory utilization with the social requirements, accounting for the territory functionality, availability of urban plantation and other amenities (Rastyapina & Korosteleva, 2016).

According to Pourahmad, et al. factors affecting women's sense of security in urban areas are: 1.Street harassment 2. Traffic safety in the city for women at night 3. Women's traffic monitoring agent 4. Public, social and natural monitoring 5. Artificial monitoring (such as CCTV)(Ditton, 2000) 6. Lightening of roads and alleys 7. Quality of sidewalks 8. Vegetation and green spaces 9. Visibility of the environment 10. Presence of police 11. Role of colors in the urban spaces 12. Urban transportation 13. Role of Hijab 14.

Physical environment 15. Accessibility (Pourahmad et al., 2017).

4. Research background

In order to provide smart and effective solutions for women's sense of security and accessibility in urban environments, various researches have been carried out by researchers. In the present study, we have attempted to use the experience obtained from the prior studies so as to get to smart solutions in the urban areas.

Ali Goli emphasizes that biologically, women, as well as half of human communities, have different levels of responsibility compared with men. special facilities are entailed for women to enhance their confidence in urban spaces, especially public spaces (Goli, 2012).

A study by Braun et al. (Braun et al., 2018: 499-507) entitled "Security Challenges and Privacy in Smart Cities" shows that smart city security challenges include privacy with large-scale data, security of a large-scale network, the creation of reliable data sharing methods, the proper use of artificial intelligence and the reduction of errors caused by smart grids. The results of Susanti et al. showed density is not related to the level of satisfaction of people. Given the density of population, urban problems might be reduced by digitization solutions (Susanti et al., 2016: 194-201).

In a study of the concept of smart city, Eremia et al. (Eremia et al., 2017: 12-19) presented a brief overview of the evolution of the smart city and its features. Development of smart cities is strongly related to the level of intelligence of dependent electrical networks thatshould provide electrical energy to all consumers with certainty of some of the characteristics of the city, but the most critical aspect of Coordination is easy coordination between urban government, different infrastructure operators and their responsibility for public safety and health. Han and Howken (Han & Hawken, 2018) in their paper showed that in modern cities cultural differences, human behavior and social identity require more attention, and they identified urban identity and culture as the main focus of the smart city.

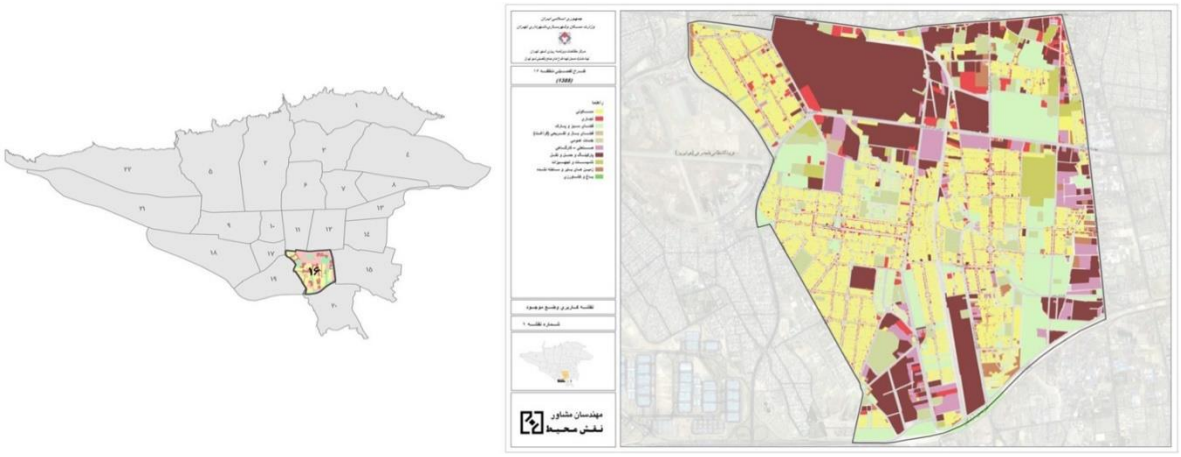
Lacinák and Ristvej in their research focused on safety and security in the smart cities of the future. The results showed that in all areas, technology development should be followed by educating citizens about way of using them. Even the most advanced smart city would not succeed, unless it increases its smart citizenship and education (Lacinák & Ristvej, 2017: 522-527). Findings of another study by Biag et al. (2017: 3-13) show that Smart City consists of four significant elements: smart grids, building automation systems, unmanned aerial vehicles and smart devices. Geffinger (2007) considers security as one of the smart metropolitan areas; In his book, security is one of the six components of intelligent life.

Fear is afactor that has an important role in depriving women of the city's public spaces. Urban spaces have been divided into considerations of the safety features of multiple defenseless spaces and indescribable spaces. Newman put forward his idea in the form of defensible space theory. In this theory, emphasis was placed on factors such as the creation of proper territory, the sense of place attachment, and the possibility of monitoring and improving physical conditions to reduce fear (Newman, 1996).

Akbari and Lotfaliayn in a local study done on Tarkhani Bazzar in Tehran, stated that Safe separation of pedestrian crossings is one of the most important indicators of traffic in any sustainable urban area (Akbari & Lotfalian, 2020). Motalebi and his colleague in their study about woman security feeling in south of Tehran showed that feeling of security had a direct impact on the desirability of urban space as well as the increase in the price of residential units and the more remarkable stability of the social structure in neighborhoods.

5. Research Context

The study area is located in District 1, Zone 16 of Tehran (Fig. 1). This area, being impoverished, is located in the southern part of Tehran, from the north it gets to the 11th and 12th districts of the east, within the bounds of regions 15 and south of the region 20, from the west it gets to the limits of 17 and 19. The area is divided into 6 districts and 22 neighbourhoods, and intersectional communication systems in the area are chess networks that provide proper local accessibility.



Picture 1 . Location of study area (source: Tehran municipality)

This area is located in the newly developed section of Tehran; the area is about 16.50 km^2, equivalent to 2.5 percent of the city of Tehran. The population status of this region has experienced positive and negative growth over the past decades (Table 3 and 4).

Table3. Demographic situation of Tehran and region 16 and growth rate, (Iranian Centre for Statistics)

Year	Tehran city		District 16		Logical share of Tehran city (percent)
	Growth rate (percent)	Population number	Growth rate (percent)	Population number	
1976	4530223	-	347535	-	**7.67**
1986	6058207	2.95	314801	-0.98	**5.20**
1996	6758848	1.10	289474	-0.84	**4.28**
2006	7812067	1.46	291169	0.06	**3.73**
2011	8154051	0.86	287803	-0.23	**3.53**

Table 4. Population in the sixth region of the region

	Neighborhood population	Current status	Absent residence status	abroad	Others	Did not comment
District 1	49589	48603	292	11	15	208
District 2	46352	45328	589	14	23	399
District 3	75409	73742	958	23	38	649
District 4	52317	51161	664	16	26	450
District 5	51616	50475	656	15	26	450
District 6	12520	12244	159	4	6	108
Whole area	287803	281440	3656	88	144	2475

6.Analysis of Current Situation of the Region by SWOT Technique

Since the SWOT technique is a tool for recognizing the weaknesses and strengths as well as the opportunities and threats of the case, and management strategies should be established based on these four principles, by completing its matrix, various strategies are developed to guide the system in the future (Golkar, 2006). For this purpose, strengths, weaknesses, opportunities and threats are analyzed in four interactive modes SO, WO, ST and WT, and strategic solutions are then extracted.

The structure of this case study is such that most of the spaces possesse insufficient physical and spatial quality. Environmental pollution in

passages, lowly social status, lack of suitable urban furniture, lack of lightning and inadequate lighting of alleys and roads, narrow deadlocked alleys, quietness of the roads, interference of roadways and pedestrians, lack of enough parking spaces, rugged passages, lack of comfort and psychological security in neighborhoods, insecure spaces, as well as the lack of local services, lack of nightlife, accumulation of garbage are the most important problems in the study area that directly or indirectly affect the sense of security of residents of the neighborhoods, especially women. Measuring the current status of the range based on the SWOT technique shows the strengths, weaknesses, opportunities and threats in this range.

Picture 3: Lack of traffic safety, infringement of cars to the sidewalks, lack of pedestrians and wandering pedestrians at the level of passages – (Lotfaliyan, 2018)

Picture 4: The existence of empty and uncontrolled spaces that lead to accumulation of delinquent individuals, insecurity in the environment (Lotfaliyan, 2018)

Picture 5

Picture 6

Picture 7

Picture 5: Overflow of trash bins, causing the accumulation of vermin and pollutants in the environment (Lotfaliyan, 2018).

Picture 6: Lack of adequate lighting in environments and consequently, lack of active presence at different hours (Lotfaliyan, 2018).

Picture 7: Poor quality of urban furniture (Lotfaliyan, 2018).

7. Data Analysis

7-1. Categorising and encoding data: Data obtained from field findings, observations and interviews were implemented for the first analysis. The most frequently repeated topics were then highlighted and arranged in the SWOT table (Table 5). 120 women between the ages of 17 and 70 who had lived in the area for more than five years were randomly interviewed; The interview was conducted in a semi-structured manner. The general questions were designed in such a way that people could talk about the strengths and weaknesses, as well as the opportunities and threats of the neighborhood. The audio file of the interviews was applied and the topics loisted below the SWOT table were coded.

Table 5. SWOT Analysis of Case Study

Strength	Opportunity	Weakness	Threat
S1. Long residence history S2. Familiarity of the inhabitants with each other S3.The relatively low cost of buying or renting	O1.Land for building houses O2. Ability to renovate worn textures O3.Trans-regional functions	W1.No attention to proper lighting of the passageways at night W2.No readability of walking paths W3.There is a tendency to move to other places in the most residential area W4.Lack of good quality of public areas in the range W5.Lack of advertisements W6.Flooded passageways in rainy days W7.High density of residential houses W8.Lack of enclosure space in the area that is not monitored W9.Buildings with inappropriate, dirty and confusing appearance W10.Lack of green space W11.Lack of quality of unsuitable urban furniture in the range W12.Lack of activities. Women's gathering place	T1.Increase social anomalies in the range T2. High density of residential users in the range T3.Environmental pollution

7- 2. Validity and reliability test of data: The re-test index was used to measure the validity and reliability of the data (Rabin et al., 2006). to check the amount of agreements and non-agreements, from the all written interviews 5 interviews were randomly selected, and with an interval of two weeks, 5 architecture and urban design experts were asked to extract the topics and to categorize them under the four categories of weaknesses, strengths, opportunities and challenges. the agreements are specified by citing two codes and non-agreements are specified by citing one code; to consider the effects, the number of agreements were multiplied by two. The results of the investigation are shown in the table 6. According to the obtained number (79.47%), the reliability of the results in the "high" category is confirmed.

Table 6. Calculate validity and reliability by re-test index

	Interview code	Total number of codes	Number of agreements	Number of disagreements	Reliabilty of retest
1	M1	26	10	6	76.92%
2	M2	30	12	6	80%
3	M3	32	14	4	87.5%
4	F1	36	15	6	83.3 %
5	F2	27	9	9	66.66%
	total	151	60	31	79.47%

The present study is encountering problems in the field of security. Table 7 and 8 are categorized based on the dimensions and factors in the case study. In these tables, some of the other disturbances that in the current situation create the feelings of fear and insecurity in women indicate the extent which components of the research are.

Table 7. Physical disturbances which generate fear and anxiety in women in the area

Factor	Indicator	The most important environmental features that cause fear and anxiety
Physical conditions	**Physical structure**	- P11: Enclosure spaces in the area which are not monitored. -P12: Nonlevel and uneven condition of roads
	Physical qualities	- P21: The existence of abandoned and destructive buildings in this area as a venue for accusation of criminals -P22: Burnout and worn out urban texture -P23: The instability of some small and residential buildings
Environmental quality	**Visual security**	- E11: Damaged flooring of roads and alleys - E12: Annoying wall hand writings - E13: Visual disturbances resulting from disorderly and inappropriate elevations of the buildings - E14: Inappropriate lighting of passageways (lack of lightweight and appropriate lighting for some alleys and passages) -E15: Changing passages into parking lots -E16: Environmental pollution
	Environmental security	- E21: Lack of green space and appropriate vegetation in the area - E22: Lack of suitable urban furniture in the area -E23: Lack of waste bins and as a result, pollution of the environment - E24: Absence of warning and appropriate informative signs - E25: Presence of vile animals in the environs -E26: Trash bins overflow in the environs

Table 8. Functional disturbances which generate fear and anxiety in women

Facto	Indicator	The most important environmental features that cause fear and anxiety
Status of activities and services	**Quality of residence**	- A11:There are deadlocked alleys and small residential buildings -A12: Burnout and instability of some buildings in the neighborhood
	Accessibility to services	- A21: Lack of suitable green spaces for women for spending time - A22: Lack of rest room services - A23: No uninterrupted monitoring of police stations
	Abandoned spaces	- A31: Genderization of functions in main streets - A32: Spread of alternative activities such as large parking lots in unused lands -A33: Abandoned spaces which become a suitable place for addicts
	Women's activities	- A41: Lack of suitable possibilities for women to gathering together. - A42: Lack of vitality in the night and night-time life
Status of the roads network	**Separation of pedestrians and riders**	- R11: Lack of car penetration in some parts due to the very narrow width of alleys and side streets - R12: The lack of separation of pedestrians' territory from the cavalry paths, in the valleys (Rouzi talab -Javanbakht Safiari) - R13: changing alleys to the car roads and increasing the traffic of strangers
	Public transportation network service	- R21: Lack of public transportation during the night - R22: Transportation by unconventional and informal vehicles (private cars)

To determine the intelligent management strategies of the study area, it would be necessary to determine the weight of each factor listed in Tables 7 and 8. For this purpose, ten experts in architecture, urban planning and women's psychology were asked to rate the components using the AHP method. At the end, the average scores were obtained; and they are shown in the following diagrams.

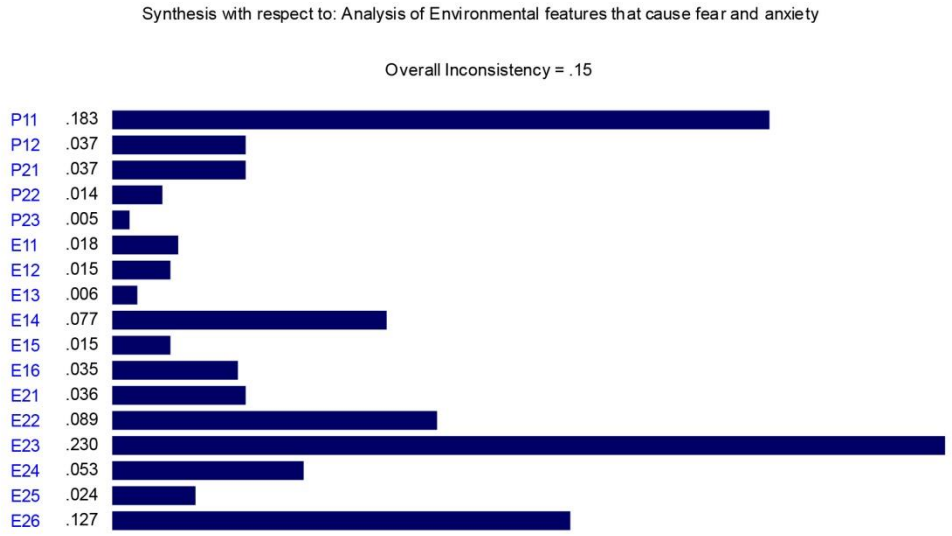


Diagram 3. Normalized weight of environmental indicators

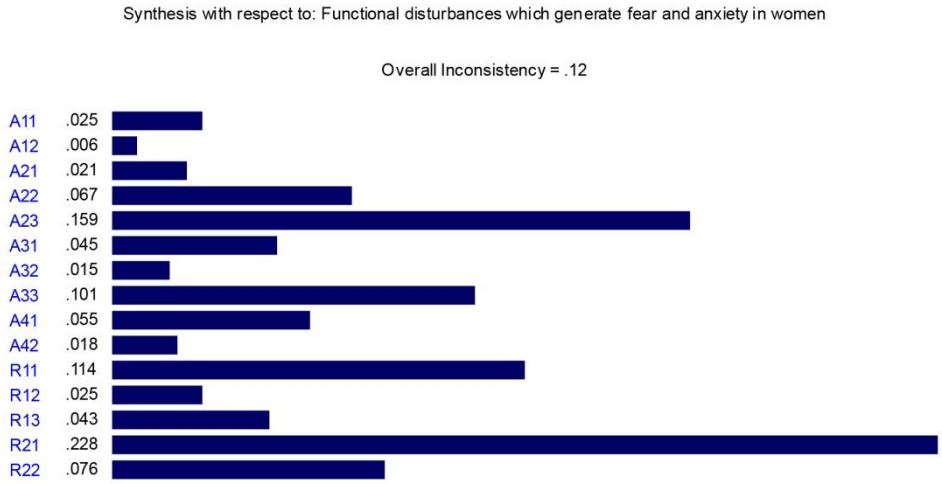


Diagram 4. Normalized weight of functional indicators

8. Strategies

There are many different solutions and methods in the field of smart urban environments. In this research, we have tried to propose solutions that have more enormous impacts on increasing the sense of security of citizens (women) and improving their life quality. Some of the solutions include:

8.1. Traffic monitoring

Monitoring represents an extremely important component in promoting the social satisfaction of women in urban environments. The monitoring agent is divided into two parts:

A. General, social and natural monitoring

B. Nonsocial surveillance, use of CCTV: where essential care is not possible. In fact, this tool has evoked a sense that the intended environment has increased the safety factor of the environment. The presence of these cameras reduces the mass in the range. Police needs to analyze and track of all these cameras; in a network and improve points of trouble, awareness of the coverage of each camera and the amount of use of in detecting a crime each camera can provide police or other related authorities with highly important or critical information, so the installation of cameras over the cities has a role in reducing crime and improving security. The target streets for placement of cameras are: Shahid Nouri Street, Zamani Street and Azadegan Street.

8.2. Smart lightening design in the passages

One of the most crucial factors in improving security is the use of lighting. Citizens can be seen properly in suitable lights. the smart lighting systems are appropriately set with proper distances, so the presence of people within the ranges can be distinguished; when the optical sensors do not detect motion, the system reduces ambient light ; simillarly, when any motion or the presence of individuals are diagnosed the light increases. Increase of ambient lights, as well as the installation of photovoltaic panels for some urban furniture, absorb radiation from the sun's energy and convert to the electricity, they can be employed independently to have night life in the range (lack of lighting on the streets of Imam Yari-Nouri-Zaman-Yarjani – Ruzitalab alley).

8.3. Availability and smartness of transportation

One of the essential factors of trustworthiness of regular service of public transportation, as well as the facilities and security of stations and terminals for women is easy accessibility. This provides a sense of security for them. Waiting station is not a new idea in urban furniture, but with smartness, it creates a new and innovative development. Integration of bus terminals with new technologies like wireless internet, wifi facilities and sensors for collecting and transmitting data and advanced technologies, traffic announcements and city traffic, as well as power boards, mobile-phone chargers powered by solar panels, has a significant impact on urban security control, management of time and energy; moreover connecting urban buses to the smart systems thereby citizens can be aware of the exact time of bus traffic is a very useful idea; then people can plan for the optimal use of time. This is the most important criterion for increasing the security of the presence of women in urban environments.

Considering specific routes for bike riderswho prefer using bysycles for transportation, as well as equipment of ways whit smart cameras certainly enhances security. This leads to the separation of ways from each other.

8. 4. Setting up polling systems

Residents who live in a part of a city know about their environment and the problems better than any other person. The existence of polling systems and people's participation can familiarize the security of authorities, judiciary and the police with the challenges and incidents of crime. Then, the residents' comments and the problem of reducing local security are sent to the police and finally presented with appropriate guidelines and suggestions.

8. 5. Online tracing defect in neighborhoods

Another smart way to reduce city problems and quickly address urban problems is to use mobile phones and to send text and pictures of the problem ahead and determine its location by GPS.

8. 6. Proper area of garbage bins

Consideration of the invisible digital sensors in the area after embedding and choosing correct positions for trash cans would be another suggestion. When these garbage cans spill out, a message is sent to the relevant unit at the appropriate time, thus the agents take action to evacuate that the accumulation of garbage beside the passageways and gathering of insidious animals that frighten the citizens are prevented (especially women). Trash bins with smart sensors are able to measure the amount and weight of the trash inside them and can prevent the overflow of garbage.

8. 7. Equipped area with smart technologies

Taking Wi-Fi in the area and embedding places to charge laptops and phones to provide public welfare and online urban services.

8. 8. Smart city billboards

By installation of smart billboards in a wide range of areas, visual disturbances can be prevented. These billboards can be transformed into a smart look at multi-functional elements and promotions. These digital billboards provide the smart city with dynamic and active communication in urban environments.

8. 9. Smart passages

One of the factors of improvement of physical and psychological safety of the sidewalks is the quality of their networks, which improves the physical and psychological security of the users, especially the women. One of the reasons for citizens' dissatisfaction in these areas is flooded passages in rainy days. Considering smart valves which automatically open and guide the waters, is one of the solutions. It is equally possible to use paving slabs in the pavement, to convert kinetic energy of steps to eclectic energy and store it.

8. 10. Entry and exit controls within the area

To increase the sense of security in the era, as well as to prevent alien and anonymous persons, it is possible to collect and record traffic by traffic sensors.

8. 11. Smart Furniture

The use of smart furniture alongside the passageways and removal of unnecessary furniture is proposed as suitable. Location of furniture should be in a way that provides citizens with easy access to them; besides teh furniture shall be placed in the points mostly in the direction of eyes. Considering the furniture in Nour Street, which has become stagnant and unused furniture can be added to increase the sense of liveliness.

Conclusion

This research has provided smart strategies to enhance the sense of security among women in urban spaces. it seek to provide applicable solutions in District 1, Zone 16 of Tehran for women, so that they can have present in urban spaces with a sense of security, and it follows this assumption that environmental conditions and the behavior of users of space have an impact on the sense of security and presence in spaces. This is the smart city, in which social, economic, physical and social security can be created for residents, especially women.

According to the finding results, in environmental factors, pollution of the sidewalks and pedestrians is the most important factor which effects on women. Because of the pollution women are compelled to choose routes which are unsafe and dangerous. Wide and vast empty lands in the era is the second most important factor that treats women's sense of security. The most problem is gathering of addicts. Emptiness of urban space and lack of suitable furniture has caused women prevent themselves from using the spaces, and this has led to the genderization of space. Inadequate lighting is another issue that is challenging in this area. In functional factors, lack of public transportation during the night, is the most important matter, which prevents women from fulfilling their social roles in society; families also suffer from constant worrisome about their daughters working outside home. Women have noted that due to the current problems, the presence of the police in the area increases their sense of security; therefore, one of the issues that should be considered in the field of turning cities into smart cities would be the intangible presence of the police in regions. Passages geometry is another problem that needs improvement in smart ways. To answer the research questions, 11 strategies have been proposed with regard to using smart management science which significantly increases the indicators of sense of security among women in this region.

Finally, it should be emphasized that with the formation and growth of cities, one of the most substantial concerns of humankind has been security. Because in many cases, either operational actions cannot be done or it imposes huge costs on the city management. In the other hand, the security of citizens, especially women and children has always been one of the most critical issues that has been considered by planners and urban managers over the years for various reasons, such as density of population and the reduction of face-to-face relationships. Having gender attitudes to the issue of security can be considered as a kind of discrimination, because creation of the safe environment for women would have a sense of security and relaxation for children as well as men; besides, from the aspects of the social and citizenship justice, women, like men, should feel comfortable and secure in the urban space where they reside in, and their presence in the city should be unlimited by insecurity due to urbanization weaknesses.

Owing to the growth of population, the current world cities have become more complex; thus, there are many difficulties to achieve security. Information and communication technology (ICT) have been one of the greatest achievements of mankind that has affected urban spaces. Smart city is attempting to overcome problems in a smart way; the theory brings intelligence into the various layers of cities (economic, social, cultural, physical, administrative, etc.). With smart urban environments, it would be easy to accomplish some work at home and communicate with city managers for the purpose ofmaking transparency and having access to the needed informationand providin security for citizens. Urban managers, political and popular associations in some cities have come up with smart solutions to solve problems, which can be referred as urban governance. However, more smart solutions are necessary to improve the condition of urban spaces.

References

1. Akbari, A., & Lotfalian, N. (2020). Creating Pedestrian Routes and Presence in Urban Spaces as a Social Approach to Traffic Management (Case study: Tarkhani Bazaar of Tehran). *Iranian Journal of Anthropological Research*, 9(2), 147–168. https://doi.org/10.22059/IJAR.2020.78434
2. Alawadhi, S., Aldama-Nalda, A., Chourabi, H., Gil-Garcia, J. R., Leung, S., Mellouli, S., Nam, T., Pardo, T. A., Scholl, H. J., & Walker, S. (2012). Building understanding of smart city initiatives. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. https://doi.org/10.1007/978-3-642-33489-4_4
3. Albino, V., Berardi, U., & Dangelico, R. M. (2015). Smart cities: Definitions, dimensions, performance, and initiatives. *Journal of Urban Technology*. https://doi.org/10.1080/10630732.2014.942092
4. Ali Akbari, E., & Amini, M. (2010). Urban Quality of Life in Iran (1986-2006). *Social Welfare Quarterly*, 10(36), 121–148. http://refahj.uswr.ac.ir/article-1-931-en.html
5. Almasifar, N., & Ansari, M. (2010). Analysis of environmental safety in regional parks as part of the urban space from the women's perspective: Cpted approach (case study: Saie park). *Urban Management*, 8(25), 21–34. https://www.sid.ir/en/Journal/ViewPaper.aspx?ID=196616
6. Atlas, R. I. (2013). 21st century security and CPTED: Designing for critical infrastructure protection and crime prevention, second edition. In *21st Century Security and CPTED: Designing for Critical Infrastructure Protection and Crime Prevention*, Second Edition. https://doi.org/10.1201/b15046
7. Baig, Z. A., Szewczyk, P., Valli, C., Rabadia, P., Hannay, P., Chernyshev, M., Johnstone, M., Kerai, P., Ibrahim, A., Sansurooah, K., Syed, N., & Peacock, M. (2017). Future challenges for smart cities: Cyber-security and digital forensics. In *Digital Investigation*. https://doi.org/10.1016/j.diin.2017.06.015
8. Bazargan, A. (2019). *Introduction to qualitative and mixed research methods* (9th ed.). Didar Publication. https://b2n.ir/197726
9. Braun, T., Fung, B. C. M., Iqbal, F., & Shah, B. (2018). Security and privacy challenges in smart cities. *Sustainable Cities and Society*. https://doi.org/10.1016/j.scs.2018.02.039
10. Caragliu, A., del Bo, C., & Nijkamp, P. (2011). Smart cities in Europe. *Journal of Urban Technology*, 18(2), 65–82. https://doi.org/10.1080/10630732.2011.601117
11. Carmona, M., Heath, T., Oc, T., Tiesdell, S., & Carmona, M. (2012). Public Places - Urban Spaces. In *Public Places - Urban Spaces*. https://doi.org/10.4324/9780080515427
12. Chen, T. (2010). *Smart grids, smart cities need better networks*. In IEEE Network. https://doi.org/10.1109/MNET.2010.5430136
13. Colldahl, C. (2013). *Smart Cities: Strategic Sustainable Development for an Urban World* [Karlskronauniversity].https://www.diva-portal.org/smash/get/diva2%3A832150/FULLTEXT01.pdf
14. Ditton, J. (2000). Crime and the city: Public attitudes towards open-street CCTV in Glasgow. *British Journal of Criminology*, 40(4). https://doi.org/10.1093/bjc/40.4.692
15. Enhancing urban safety and security: Global report on human settlements 2007. (2012). In *Enhancing Urban Safety and Security: Global Report on Human Settlements 2007* (Vol. 9781849771146). https://doi.org/10.4324/9781849771146
16. Eremia, M., Toma, L., & Sanduleac, M. (2017). *The Smart City Concept in the 21st Century*. Procedia Engineering. https://doi.org/10.1016/j.proeng.2017.02.357
17. Giffinger, R., Haindlmaier, G., & Kramar, H. (2010). The role of rankings in growing city competition. *Urban Research and Practice*. https://doi.org/10.1080/17535069.2010.524420
18. Goli, A. (2012). Women and Safety in Public Urban Space: Case study of AZADI Park, Shiraz. *Journal of Historical Sociology*, 3(2), 143–164. https://jhs.modares.ac.ir/article-25-9674-en.html
19. Golkar, K. (2006). TAILORING SWOT ANALYTICAL TECHNIQUE TO URBAN DESIGN PRACTICE. *SOFFEH*, 15(41), 44–46. https://www.sid.ir/En/Journal/ViewPaper.aspx?ID=70615
20. Habitat. (2015). Habitat III: Third United Nations Conference on Housing and Sustainable Urban Development. *Journal of Education for Sustainable Development*. https://doi.org/10.1177/0169796x15600604c
21. Han, H., & Hawken, S. (2018). Introduction: Innovation and identity in next-generation smart cities. *City, Culture and Society*. https://doi.org/10.1016/j.ccs.2017.12.003
22. Harrison, C., Eckman, B., Hamilton, R., Hartswick, P., Kalagnanam, J., Paraszczak, J., & Williams, P. (2010). Foundations for Smarter Cities. *IBM Journal of Research and Development*. https://doi.org/10.1147/JRD.2010.2048257
23. Jacobs, J. (2016). The Death and Life of Great American Cities. In *Readings in Planning Theory*: Fourth Edition. https://doi.org/10.1002/9781119084679.ch4
24. Jeffery, C. R. (1971). Crime Prevention through Environmental Design. *American Behavioral Scientist*, 14(4). https://doi.org/10.1177/000276427101400409
25. Karadag, T. (2013). *An Evaluation of the Smart City Approach*. 日本畜産学会報.
26. Komninos, N. (2009). Intelligent cities: towards interactive and global innovation environments. *International Journal of Innovation and Regional*

Development. https://doi.org/10.1504/ijird.2009.022726
27. Lacinák, M., & Ristvej, J. (2017). Smart City, Safety and Security. *Procedia Engineering*. https://doi.org/10.1016/j.proeng.2017.06.090
28. Lazaroiu, G. C., & Roscia, M. (2012). Definition methodology for the smart cities model. *Energy*. https://doi.org/10.1016/j.energy.2012.09.028
29. Maslow, A. (2006). Toward a psychology of being. In *Toward a psychology of being*. https://doi.org/10.1037/10793-000
30. Mohanty, S. P., Choppali, U., & Kougianos, E. (2016). Everything you wanted to know about smart cities. *IEEE Consumer Electronics Magazine*. https://doi.org/10.1109/MCE.2016.2556879
31. Motalebi, G., Khodadadi Agh Ghal'e, F., & Akbari, A. (2016). Effect of the Sense of Security of Housing Satisfaction in Naziabad Residential Complex in Tehran Based On C.P.T.E.D Model. *Honar-Ha-Ye-Ziba: Memary Va Shahrsazi*, 21(1), 67–78. https://doi.org/10.22059/jfaup.2016.59690
32. Nam, T., & Pardo, T. A. (2011). Conceptualizing smart city with dimensions of technology, people, and institutions. *ACM International Conference Proceeding Series*. https://doi.org/10.1145/2037556.2037602
33. Newman, O. (1996). *Creating defensible space*. U.S. Department of Housing and Urban Development.
34. Nobakht, M. B. (2017). *Advanced Research Methods*. Jahade Daneshgahi.
35. Ojo, A., Curry, E., Janowski, T., & Dzhusupova, Z. (2015). Designing Next Generation Smart City Initiatives: The SCID Framework. In *Public Administration and Information Technology*. https://doi.org/10.1007/978-3-319-03167-5_4
36. Pourahmad, A., Arvin, M., & Rahimpour, N. (2017). Evaluation women's sense of security in urban areas (Case Study: Region 1 of Ahvaz City). *Motaleate Shahri*, 6(23), 53–68. http://urbstudies.uok.ac.ir/article_50553.html
37. Rabin, J., Hildreth, W. B., & Miller, G. J. (2006). *Handbook of Public Administration*, Third Edition (Public Administration and Public Policy). In Taylor & Francis Group.
38. Rastyapina, O. A., & Korosteleva, N. V. (2016). Urban Safety Development Methods. *Procedia Engineering*, 150. https://doi.org/10.1016/j.proeng.2016.07.292
39. Rush, M. (2014). *Politics & society. In Politics and Society*. https://doi.org/10.4324/9781315835143
40. Salehi, E. (2000). Environmental Features of Secure Urban Areas. Center for Study and Urbanization and Architecture.
41. Singleton, R. A., & Straits, B. C. (2017). *Approaches to Social Research* (Sixth Edit). Oxford University Press. https://global.oup.com/ushe/product/approaches-to-social-research-9780190614249?cc=us&lang=en&
42. Susanti, R., Soetomo, S., Buchori, I., & Brotosunaryo, P. M. (2016). Smart Growth, Smart City and Density: In *Search of The Appropriate Indicator for Residential Density in Indonesia*. Procedia - Social and Behavioral Sciences. https://doi.org/10.1016/j.sbspro.2016.06.062
43. Washburn, D., Sindhu, U., Balaouras, S., Dines, R. A., Hayes, N. M., & Nelson, L. E. (2010). *Helping CIOs Understand "Smart City" Initiatives: Defining the Smart City, Its Drivers, and the Role of the CIO*. Cambridge, MA: Forrester Research, Inc.
44. Zarghami, I., Azhdehfar, N., & Tudeh Fallah, S. (2013). *Investigation of the relationship between the design of city streets and the sense of psychological security*. https://www.civilica.com/Paper-GUPSD01-GUPSD01_1250