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Analyzing the Status of Infill Development Indexes to Obtain Passive Defense Principles (Case Study: Zahedan City)

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ABSTRACT

This research analyzes the status of infill development indexes to obtain the passive defense principles. Therefore, Zahedan city was selected for this research because of the importance and sensitive applications with the regional and trans-regional performance as the research scope. The methodology is descriptive-analytical based on the librarian, documents, and surveying studies. SPSS software and FARAS and FANP models were used to analyze data. The statistical population of this research includes experts and knowledgeable people in the field of this research. The purposeful sampling method was used for sample volume as the sampling finished up to data saturation. Therefore, 20 experts and knowledgeable people were selected based on the purposeful sampling method. The obtained results from research showed the positive and significant relationship between the statuses of infill development and passive defense principles in Zahedan city using the Spearman correlation test. Then, each passive defense principle was ranked with emphasis on the status of the infill development indexes in Zahedan using FANP and FARAS models. The results showed that dispersal principles of functions distribution in proportion with the threats and geography of Zahedan city with k=0.559, the optimal dispersal scale selection principles and economic justification of projects with k=0.435, the optimal locating principles of functions placement in space with k=0.490, safe fields selection in Zahedan city geography with k=0.435, the optimal scale determination principles to place population and activity in space with k=0.423, principles of reinforcement, fortifications, and safety of vital structures with k=0.418, principles of downsizing, cheapening and innovating in

passive defense with k=0.382, and principles of defense crisis management in areas and lands with k=0.354 have the maximum to minimum weights, respectively.

Keywords: infill development indexes, passive defense principles, Zahedan city

Introduction

Investigating the land allocation to the urban uses in existing planning models indicates that these models are inefficient (Leccese et al, 2000: 36). Dispersion of low-density residential centers and island-like urban growth, the importance of developing open spaces versus declining urban development, and scattered growth of single-family buildings with separate, non-mixed uses are the most characteristics of the existed urban forms (Galster et al., 2001: 684). Now, sustainable development is proposed as the most important approach to city management. It is opposite to the past patterns which resulted in increasing economic and social segregation, reducing the quality of the environment, destructing agricultural and barren lands, and gradually the valuable architectural structures (Leccese et al, 2000: 36). In recent decades, the new urban planning approach has been emphasized greatly in planning for the city to face these problems and achieve sustainable development. The main ideas in the new urban planning manifesto are infill development, mixed uses, compact city, and indigenous geography. Meanwhile, infill development is very important because of the preservation of environmental resources and social context, and the use of economic capacities. In general, infill development is the process of developing underused or empty urban areas that have already been developed (Williams et al, 2000: 4).

One of the most important components of infill development is its security and defense dimension, which has received less attention. Undoubtedly, security issues not only influence the internal borders of countries but also the external conditions and the environment (Mazaheri, 2019: 13). The relationship between security and human beings, space and activity, is one of the key components in infill development that stabilize and sustain the development and security. Defending the land on a national and regional scale is defending the established beings of space in addition to its political and geographical content. If human security and activity are not considered in the defense plan, instability will be the main physical and functional threat to space. In this regard, agent defense alone cannot face new and destructive offensive weapons to prevent their destructive effects on vital and sensitive centers and human resources (Siyahsar et al., 2013: 23). The suitable spaces should be created to protect people's lives against threats in designing cities and determining the required land use of the city and how they relate to each other. Continuing the necessary activities permanently and reducing the vulnerability of the city should be possible. Proper and continuous operation of infrastructure networks such as electricity transmission networks, telecommunications, and

transportation has a direct impact on various social, economic, and industrial activities (Passive Defense Organization, 2013). Determining the proper urban planning models, a network of roads and urban infrastructure, distribution of the population, their proper services, application of multi-purpose functions and uses, and their adjacency are the requirements of design and urban planning. In this regard, the status of infill development indexes to obtain the passive defense principles in cities plan is one of the necessities of urban planning.

Therefore, border areas of Iran are considered one of the key vulnerable points in times of threat because of the location of more than half of the population of important and vital facilities in these points. In this regard, removing the vulnerabilities in border areas, strengthening physical and non-physical ties with the interior parts of Iran, designing and planning of development and security systems, implementing multi-purpose infrastructure projects in the form of dual-purpose civil defense, making defense facilities and fortifications, if needed, are the facilities of the passive defense in border areas (Fazelnia et al., 2012: 14). The application of this knowledge associated with the infill development indexes should be mentioned.

One of the sensitive border cities in Iran is Zahedan in Sistan and Baluchistan province. Zahedan has always been mentioned based on security due to its location in one of the most sensitive areas of Iran and its neighborhood with Pakistan and Afghanistan. Unfortunately, this city has always been neglected in its development plans. In this regard, it is in a worse social and economic situation than other centers in the provinces of the country. In fact, the status of infill development indexes is not considered in the principles of passive defense in this city. Therefore, this area should be specifically mentioned according to the importance of maintaining the population in this sensitive area. In this regard, this research aims at analyzing the position of infill development indexes to obtain passive defense principles in Zahedan that the following questions are asked to answer the research questions:

What is a relationship between the status of infill development indexes and obtaining the passive defense principles?

In which principles of passive defense is the status of infill development maximum?

Research background

A part of the literature is investigated here. Noticeably, no research has been conducted to analyze the status of infill development indexes to obtain the passive defense principles in Zahedan. Thus, studies overlapping this research title are investigated in this part .

Sangi and Rafieian (2013) concluded in a research under the title of “measuring residential utility in urban infill development using fuzzy logic decision model in District 19 of Tehran Municipality” that it is not possible to develop housing

capacities and increase the population due to the lack of services of the Minister of Urban Construction despite the existence of vacant, barren and abandoned lands that can be developed in the areas. It means that the only detection of empty and barren lands or lands with disproportionate use and filling the existing tissue was not enough to face the problem of population overflow and meet the demand for housing and services. It is essential to execute the other capacities of infill development in addition to the mentioned capacities .

Saeedi R. et al. (2013), in a research of "applying the infill development principles in the functional-spatial improvement of the urban texture in district 17 of Tehran municipality", concluded that applying the infill development principles in the urban textures is possible according to the defined localized indexes and providing a technic to obtain sites with higher potentials to develop and rank their valuations. Furthermore, they referred to the other findings to determine the proper lands and areas for infill development.

Hejazian et al. (2015) in their research of "investigating the effective factors in passive defense in Zahedan using SWOT technic" provided the essential policies to reduce the vulnerability of the central texture of the city, and investigated the population density, application density, network of roads, and the amount of traffic in the central part of the city based on passive defense.

Beygi (2018), in his research under the title of "localizing human shelters with GIS and hierarchical analysis and passive defense approach in Zahedan" detected 4 criteria and 14 sub-criteria effective in localizing the public shelters, and measured by AHP technic. Finally, he detected the most preferred places in proportion with the objective in GIS software and fuzzy area.

Tavakolinia et al. (2019) in a research of "analysis of the special pathology from the physical structure and the city social texture by passive defense approach of the case study: district 6 of Tehran", concluded that the vulnerability of the region is secondary and downward in terms of physical structure. In addition, the vulnerability of the social texture of the region is above the average level. Finally, the effective factors on the vulnerability of physical structure and social context were examined. In this regard, it can be stated that the population and construction density index is an effective factor on vulnerability based on experts' opinions. In addition, it was indicated that education and awareness, resilience against the security-military threats, skills, and expertise indexes are effective on the vulnerability of the social fabric of the region, respectively.

Schmidtlein et al. (2011) examined the spatial relationship between social vulnerability and earthquake damage estimation in their research.

The position of the studied area

This research was conducted for Zahedan city, the capital of Sistan and Baluchestan province. The population of this city is 587730 people (146717 families) based on

the general population census in 2016. Zahedan town with an area of 36581 km2 (Zahedan city with an area of 55.7 km2) is in Sistan and Baluchistan province. This town has 2 urban centers, 3 districts, and 6 villages. Zahedan is bounded on the north by Zabul town, on the south by Khash town, on the east by Afghanistan and Pakistan, and on the west by Fahraj town and Loot Desert. The population density for the city is 18.4 people/km2 which is important in the discussion of passive defense.

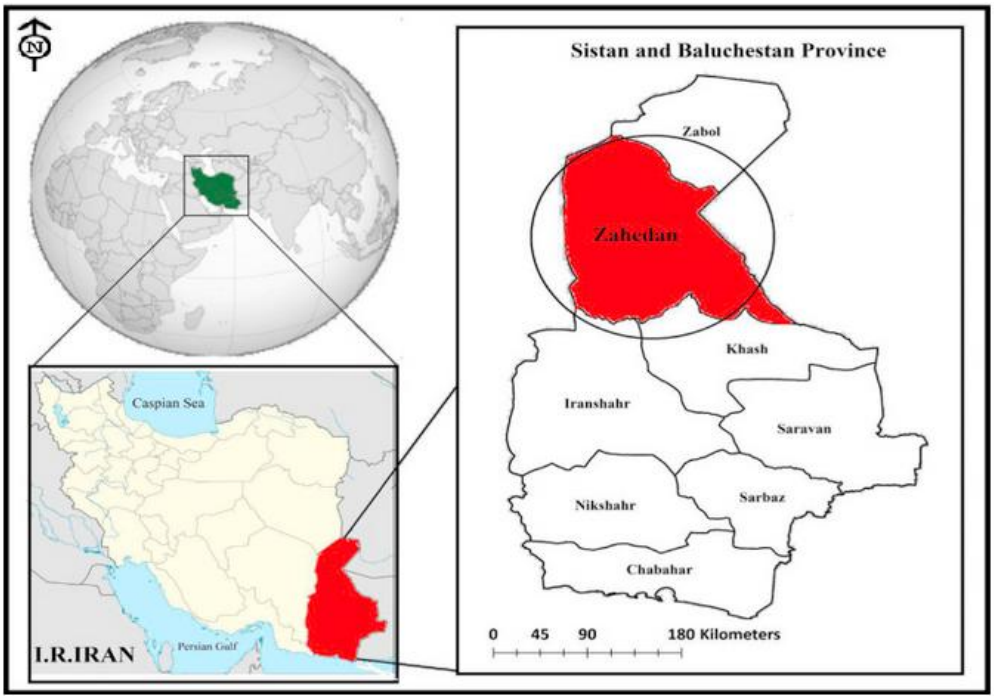

Fig 1: Geographical location of Zahedan in Iran and Sistan and Baluchestan province

Methodology

The studied issue in this research is analyzing the status of infill development indexes to obtain the passive defense principles in Zahedan. The methodology of this research is descriptive-analytical and is applied-developmental based on its objective. Moreover, the data collection tool in the theoretical basis part is librarian, surveying based on the researcher-made questionnaire. The statistical population of this research includes experts and knowledgeable people in the field of this research. A purposeful sampling method was used in this part for sample volume as the sampling finished up to data saturation. Therefore, 20 experts and knowledgeable people were selected based on the purposeful sampling method. In addition, infill development indexes and items and passive defense principles were coded based on the research objectives (1, 2). Noticeably, all items changed into one item to measure the independent variable (infill development) after questionnaires distribution based on the studied items and data collection in SPSS software in computing variable part. Afterward, the resulted items from summing

up all items, the infill development was considered as an independent variable. Moreover, content validity was used to evaluate the tool validity in a way that the questionnaires were given to the relevant experts and academic professors about the research title before execution (face validity). Then, they were distributed after several corrections. Cronbach's alpha coefficient was used to determine the reliability of the tool and the average of this statistics was obtained 0.876 for the questionnaire (number of the pilot sample=30). This value shows the high validity of the research indexes. Moreover, correlation statistical tests and FARAS and FANP models were used to analyze the research questions.

Table 1: Components, indexes, and items of infill development

Component	index	items
Network characteristics	Access to the public transportation of permeability	by reducing development pressures in green areas, regenerating neighborhoods with urban centers, increasing the tax base by creating value in the property or reviving its value, allocating appropriate and efficient land use to unsuitable land uses or lands without land use, dense development, mixing of land uses, involving local community, optimal use of existing infrastructure and facilities, developing the road network with emphasis on pedestrian movement and public transportation, optimal use of the width of the road, repair and organization of old buildings for new uses
Visual characteristics	Buildings quality, existence of destructive and abandoned land uses, existence of barren and undeveloped lands, worn texture	
Compression characteristics	population density	
Quantitative characteristics	Number of layers, pieces sizes, and granulation	
Construction characteristics	building structure	
Application characteristics	Zones with mixed applications of detailed plan, industrial-workshop lands, and warehouse transportation	
Policies, rules, and regulations	Mandatory cumulative zones of detailed design, detailed design high-rise zones	

Reference: Saeedi R. et al. 2013

Table 2: Passive defense principles

Principles	Actions
Principles of selecting safe areas in the geography of Zahedan	Investigation and analysis of external and internal threats
	Evaluating the vulnerable areas of Zahedan to threats
	Rating Zahedan based on security and coverage against threat
	selecting the right distance from the border to the threat
	Using the defensive potential of land
Determining the optimal scale of population and activity placement in space	Analysis and investigation of all performances
	The precise interaction between three elements of population, performance, and scale of Zahedan city
	Scale analysis in terms of economics and size and determination of the optimal scale
Dispersion in functions distribution in proportion to the threats and geography of Zahedan city	Analysis and investigation of all types of functions in each system and project
	Investigation and analysis of threats, borders, and military geography
	Determining safety, protection, and defense standards
Downsizing, cheapening, and innovating in passive defense	Avoiding the vital and sensitive center development on a large scale
	Downsizing, dispersing, increasing, and optimal scale
	Preventing the executive costs increase if plans are not executed.
	Tracking the plans to be economic and not imposing high costs.
Selecting the optimal scale for dispersion and economic justification of projects	Classification of centers as supplying and replaceable if destruction, non-supplying, and production occur.
	Definition and rating of security for each plan against threats
Strengthening, reinforcing, and securing the vital structures	Strengthening critical systems in ongoing projects
	Determining the safety of each system against threats and their rating
	Providing safety in stabilizers for systems
	Bringing the proper safety and strength based on the importance of each design and structure
Optimal localization of functions placement in space	Using the robust technical standards in critical and sensitive structures
	Selecting a safe area according to the military geography and safe area
	Determination of the indexes and standards of passive defense in functions placement
Defense crisis management in areas and lands	Investigating the safe places in the safe geographical area of Zahedan
	Crisis management to manage disasters and consequences
	Prioritize needs and centers to critical and sensitive facilities
	Identification and analysis of threats and general scenario of Zahedan
	Preparing the threat scenario in each area

Findings

Descriptive findings

According to the obtained information from the sample population (the experts and knowledgeable people) who were selected as 30 by purposeful sampling method, most participants were male (27 people) (90.00) and less were female (3 people) (10.00). Furthermore, the studied participants were divided into 3 age groups of 25-35, 36-56, and 56-66. According to the obtained results, the maximum frequency is for the age group of 25-35, which includes 19 people (63.33), and the minimum frequency is for the age group of 56-66 with a frequency of 4 people (33.33). In addition, participants were divided into 3 classifications of bachelor, master, and finally, Ph.D. based on education. Based on results, the maximum participation was for a Ph.D. group with 15 members (50.00) and the minimum participation was for a bachelor with 2 members (6.66). Furthermore, the frequency distribution of participants was divided into 6 groups based on the job. Groups include faculty members, research deputy of strategic center, deputy of engineering and passive defense, commander of NAJA, an employee of passive defense organization, and guard (Military). Based on the results, the maximum participants were the employees of the population of passive defense organizations with a frequency of 15 and a value of 50.3300.

Analytical findings

The Spearman correlation coefficients between the status of infill development indexes and passive defense principles in Zahedan city showed the positive and significant relationship between the independent variable (the status of infill development indexes) and passive defense in 99% sig. level. The correlation matrix between the independent variable and passive defense is shown in Table (3).

The strong correlation between the principles of safe fields selection in the geography of Zahedan city with Spearman correlation coefficient of 0.456, determination of the optimal placement of population and activity in space with the correlation of 0.556, dispersal functional distribution in proportion to Zahedan city geography, and threats with the value of 0.543, downsizing, cheapening and innovating in passive defense with a coefficient of 0.568, selecting the optimal scale of dispersion and economic justification of projects with a coefficient of 0.558, strengthening, reinforcing, and securing the vital structures with a value of 0.568, the optimal localizing for functions placement in space with a value of 0.598, and defense crisis management in areas and lands with a value of 0.5551 showed the positive and significant relationship between the status of infill development indexes and passive defense principles in Zahedan.

Table 3: The result of correlation analysis between the infill development indexes and passive defense principles

Principle	Independent variable	r	p	Correlation coefficient type
Selecting the safe areas in the geography of Zahedan	infill development indexes	0.456	0.000	Spearman
Determining the optimal scale of population and activity placement in space		0.556	0.000	
Dispersion in functions distribution in proportion to the threats and geography of Zahedan city		0.543	0.000	
Downsizing, cheapening, and innovating in passive defense		0.512	0.000	
Selecting the optimal scale for dispersion and economic justification of projects		0.558	0.000	
Strengthening, reinforcing, and securing the vital structures		0.568	0.000	
Optimal localization of functions placement in space		0.598	0.000	
Defense crisis management in areas and lands		0.551	0.000	

Actually, infill development has positive and significant effects to obtain the passive defense principles by reducing development pressures in green areas, regenerating neighborhoods with urban centers, increasing the tax base by creating value in the property or reviving its value, allocating appropriate and efficient land use to unsuitable land uses or lands without land use, dense development, mixing of land uses, involving the local community, optimal use of existing infrastructure and facilities, developing the road network with emphasis on pedestrian movement and public transportation, optimal use of the width of the road, repair, and organization of old buildings for new uses.

Then, each passive defense principle is ranked with emphasis on the status of infill development indexes in Zahedan using FANP and FARAS models. The results are as follows:

Super matrix columns were presented after determining the weights of each proposed criteria. The weighted super matrix is obtained by multiplying the weight of criteria by the corresponding weight.

Passive defense principles were then evaluated using the FARAS model. The experts were asked to evaluate the passive defense principles based on its items in the prepared questionnaire for FARAS technic. Before any analysis, the abbreviation of each of the items of passive defense principles was identified in advance (Table 4).

Table 4: Symbol each of the items of the principles of passive defense

Principles	Actions	Symbol
Principles of selecting safe areas in the geography of Zahedan	Investigation and analysis of external and internal threats	C11
	Evaluating the vulnerable areas of Zahedan to threats	C12
	Rating Zahedan based on security and coverage against threat	C13
	selecting the right distance from the border to the threat	C14
	Using the defensive potential of land	C15
Determining the optimal scale of population and activity placement in space	Analysis and investigation of all performances	C21
	The precise interaction between three elements of population, performance, and scale of Zahedan city	C22
	Scale analysis in terms of economics and size and determination of the optimal scale	C23
Dispersion in functions distribution in proportion to the threats and geography of Zahedan city	Analysis and investigation of all types of functions in each system and project	C31
	Investigation and analysis of threats, borders, and military geography	C32
	Determining safety, protection, and defense standards	C33
Downsizing, cheapening, and innovating in passive defense	Avoiding the vital and sensitive center development on a large scale	C41
	Downsizing, dispersing, increasing, and optimal scale	C42
	Preventing the executive costs increase if plans are not executed.	C43
	Tracking the plans to be economic and not imposing high costs.	C44
Selecting the optimal scale for dispersion and economic justification of projects	Classification of centers as supplying and replaceable if destruction, non-supplying, and production occur.	C51
	Definition and rating of security for each plan against threats	C52
Strengthening, reinforcing, and securing the vital structures	Strengthening critical systems in ongoing projects	C61
	Determining the safety of each system against threats and their rating	C62
	Providing safety in stabilizers for systems	C63
	Bringing the proper safety and strength based on the importance of each design and structure	C64
Optimal localization of functions placement in space	Using the robust technical standards in critical and sensitive structures	C71
	Selecting a safe area according to the military geography and safe area	C72
	Determination of the indexes and standards of passive defense in functions placement	C73
Defense crisis management in areas and lands	Investigating the safe places in the safe geographical area of Zahedan	C81
	Crisis management to manage disasters and consequences	C82
	Prioritize needs and centers to critical and sensitive facilities	C83
	Identification and analysis of threats and general scenario of Zahedan	C84
	Preparing the threat scenario in each area	C85

Table 5: Integration opinion of Experts

	Principles of selecting safe areas in the geography of Zahedan			Determining the optimal scale of population and activity placement in space			Dispersion in functions distribution in proportion to the threats and geography of Zahedan city			Downsizing, cheapening, and innovating in passive defense		
	α	β	γ	α	β	γ	α	β	γ	α	β	γ
C11	4.45	3.34	3.14	5.56	6.67	7.76	6.65	7.89	9.95	9.34	5.56	5.67
C12	5.56	7.76	5.54	3.34	3.42	3.56	7.76	5.56	5.67	3.45	5.67	9.65
C13	3.34	4.54	5.67	3.56	3.54	5.67	5.56	4.45	4.45	4.45	5.67	5.67
C14	5.67	6.65	6.74	4.34	6.87	6.89	9.95	6.76	3.34	3.45	5.56	6.65
C15	9.95	3.34	4.45	4.45	5.54	5.56	4.45	6.67	5.57	6.65	7.89	4.45
C21	5.56	7.76	5.54	3.34	3.42	3.56	7.76	5.56	5.67	3.45	5.67	9.95
C22	5.43	6.65	6.78	8.85	5.56	5.56	9.95	9.95	9.95	9.95	5.56	5.43
C23	6.64	5.54	3.34	5.44	4.42	4.45	3.35	9.95	6.89	8.82	6.78	5.56
C31	3.34	4.45	5.56	7.78	6.65	6.65	4.45	5.56	3.34	3.45	5.56	6.65
C32	3.45	5.54	6.78	3.45	8.85	6.78	6.74	4.34	6.87	6.89	9.95	6.76
C33	4.45	3.34	3.14	5.56	6.67	7.76	6.65	7.89	9.95	9.34	5.56	5.67
C41	10	10	10	9.5	9	8	3.67	6.66	7.67	8	9.95	5.56
C42	3.45	5.54	6.78	3.45	8.85	6.78	6.74	4.34	6.87	6.89	9.95	6.76
C43	8.33	6.65	6.78	8.85	5.56	5.56	9.95	10	10	10	5.56	5.43
C44	6.64	5.54	3.34	5.44	4.42	4.45	3.35	9.95	6.89	8.82	6.78	5.56
C51	8.85	6.78	6.74	4.34	6.87	6.89	9.95	6.76	3.34	3.45	5.56	6.65
C52	5.56	7.76	5.54	3.34	3.42	3.56	7.76	5.56	5.67	3.45	5.67	9.95
C61	8.33	6.65	6.78	8.85	5.56	5.56	9.95	3.34	9.95	5.56	5.56	5.43
C62	6.44	3.54	4.34	5.44	3.42	3.45	3.35	7.95	5.89	6.82	6.78	5.56
C63	9.95	3.34	4.45	4.45	5.54	5.56	4.45	6.67	5.57	6.65	7.89	4.45
C71	3.45	5.54	6.78	3.45	8.85	6.78	6.74	4.34	6.87	6.89	9.95	6.76
C72	4.45	3.34	3.14	5.56	6.67	7.76	6.65	7.89	9.95	9.34	5.56	5.67
C73	5.67	6.65	6.74	4.34	6.87	6.89	9.95	6.76	3.34	3.45	5.56	6.65
C81	9.95	3.34	4.45	4.45	5.54	5.56	4.45	6.67	5.57	6.65	7.89	4.45
C82	5.56	7.76	5.54	3.34	3.42	3.56	7.76	5.56	5.67	3.45	5.67	9.95
C83	5.43	6.65	6.78	8.85	5.56	5.56	9.95	9.95	9.95	9.95	5.56	5.43
C84	3.34	4.54	5.67	3.56	3.54	5.67	5.56	4.45	4.45	4.45	5.67	5.67
C85	6.64	5.54	3.34	5.44	4.42	4.45	3.35	9.95	6.89	8.82	6.78	5.56

Table 6: Integration opinion of Experts

	Selecting the optimal scale for dispersion and economic justification of projects			Strengthening, reinforcing, and securing the vital structures			Optimal localization of functions placement in space			Defense crisis management in areas and lands		
	α	β	γ	α	β	γ	α	β	γ	α	β	γ
C11	3.34	3.32	9.95	3.21	3.45	6.33	5.67	8.85	3.67	5.54	6.74	3.45
C12	3.67	6.43	9.95	3.33	8.33	6.32	5.56	5.56	6.74	6.65	9.95	8.85
C13	6.74	5.34	5.56	8.43	6.64	4.44	6.76	4.42	9.95	5.54	3.35	5.44
C14	9.95	4.32	6.78	5.41	8.85	4.32	5.43	6.87	3.35	6.78	9.95	4.34
C15	3.35	3.33	5.56	4.31	5.56	5.32	5.56	3.42	9.95	7.76	7.76	3.34
C21	9.95	8.43	5.67	3.32	8.33	3.32	6.65	5.56	7.76	6.65	9.95	8.85
C22	7.76	5.31	5.56	8.76	6.44	5.44	9.95	3.42	9.95	3.54	3.35	5.44
C23	9.95	4.31	6.78	5.41	9.95	3.41	5.43	5.54	3.35	3.34	4.45	4.45
C31	3.35	3.24	7.89	4.21	3.45	4.52	5.56	8.85	4.45	5.54	6.74	3.45
C32	4.45	5.33	9.95	3.33	4.45	6.55	4.45	6.67	6.74	3.34	6.65	5.56
C33	6.74	3.31	5.56	5.43	5.56	6.43	6.76	3.42	6.65	7.76	7.76	3.34
C41	6.65	3.56	5.67	3.36	3.34	3.51	5.67	3.54	7.76	4.54	5.56	3.56
C42	7.76	4.31	5.67	3.45	5.67	5.44	9.65	6.87	5.56	6.65	9.95	4.34
C43	5.56	4.21	5.56	4.44	9.95	5.54	5.67	5.54	9.95	3.34	4.45	4.45
C44	9.95	3.34	7.89	4.47	5.56	5.44	6.65	3.42	4.45	7.76	7.76	3.34
C51	4.45	7.65	5.67	3.44	5.43	3.51	4.45	5.56	7.76	6.65	9.95	8.85
C52	7.76	5.44	5.56	7.65	6.64	5.51	9.95	4.42	9.95	5.33	3.35	5.44
C61	9.95	7.44	6.78	5.41	3.34	4.44	5.43	6.65	3.35	4.31	4.45	7.78
C62	3.35	4.31	5.56	7.55	5.67	6.61	5.56	6.87	4.45	4.55	9.95	4.34
C63	4.45	3.33	5.56	3.33	3.45	6.76	6.65	8.85	9.95	6.32	6.74	3.32
C71	9.95	3.31	6.33	3.44	3.45	6.33	6.65	7.44	6.74	4.43	6.74	3.36
C72	6.74	5.76	6.44	3.32	8.33	4.45	5.56	5.43	3.44	5.45	9.95	6.65
C73	3.22	5.31	6.44	3.34	6.64	4.43	6.76	4.32	6.41	6.43	3.35	5.41
C81	6.34	4.33	5.55	3.56	8.85	5.56	5.43	5.44	5.44	5.55	9.95	4.32
C82	9.45	3.21	6.43	4.76	5.56	6.67	5.56	3.41	4.31	5.54	7.76	3.31
C83	3.31	5.76	5.41	4.32	8.33	4.32	6.65	4.43	5.44	5.61	9.95	8.66
C84	9.55	5.32	5.56	3.67	6.44	3.31	9.55	3.32	6.43	4.55	3.35	4.56
C85	7.32	4.45	5.51	3.78	9.95	5.43	8.54	5.41	6.43	4.56	4.45	3.43

After normalizing the initial values of the matrix, the decision is made to the function of the degree of efficiency and utility of each option .

Table 7: The function of the degree of efficiency and utility

	Principles of selecting safe areas in the geography of Zahedan			Determining the optimal scale of population and activity placement in space			Dispersion in functions distribution in proportion to the threats and geography of Zahedan city			Downsizing, cheapening, and innovating in passive defense		
	α	β	γ	α	β	γ	α	β	γ	α	β	γ
⊗S	0.123	0.212	0.256	0.221	0.189	0.312	0.243	0.278	0.278	0.134	0.189	0.220
S_j	0.223			0.234			0.321			0.193		
K_j	0.435			0.423			0.599			0.382		

Table 8: The function of the degree of efficiency and utility

	Selecting the optimal scale for dispersion and economic justification of projects			Strengthening, reinforcing, and securing the vital structures			Optimal localization of functions placement in space			Defense crisis management in areas and lands		
	α	β	γ	α	β	γ	α	β	γ	α	β	γ
⊗S	0.154	0.312	0.312	0.176	0.204	0.189	0.114	0.234	0.223	0.215	0.198	0.167
S_j	0.265			0.214			0.256			0.154		
K_j	0.577			0.418			0.490			0.354		

Based on calculations, dispersal principles of functions distribution in proportion with the threats and geography of Zahedan city with k=0.559, the optimal dispersal scale selection principles and economic justification of projects with k=0.435, the optimal locating principles of functions placement in space with k=0.490, safe fields selection in Zahedan city geography with k=0.435, the optimal scale determination principles to place population and activity in space with k=0.423, principles of reinforcement, fortifications, and safety of vital structures with k=0.418, principles of downsizing, cheapening, and innovating in passive defense with k=0.382, and principles of defense crisis management in areas and lands with k=0.354 have the maximum to minimum weights, respectively.

Conclusion

Urban security and the need to pay attention to it is the antiquity of human civilization. Different approaches have been adopted to deal with them based on the variety of threats in each period of the history of the city and urbanization. One approach to reducing the damage and casualties has been a passive defense in contemporary urbanization, especially after the world wars, and over time and its importance in cities have been considered by planners, policymakers, and city managers. This approach has been used in recent decades from large-scale projects such as land management and regional planning down to the micro-level in cities. In this regard, the status of infill development is becoming more and clearer to obtain the principles of passive defense in cities, especially border cities of Iran. Therefore, this research analyzes the status of infill development indexes to obtain the passive defense principles in Zahedan city. Thus, it is tried in this research to determine the relationship between the infill development indexes and passive defense principles in addition to identifying the most important principles of passive defense with an emphasis on the infill development indexes. The results of this research showed the positive and significant relationship between the infill

development indexes and passive defense principles. Actually, infill development has a positive and significant effect to obtain the passive defense principles in Zahedan city (by reducing development pressures in green areas, regenerating neighborhoods with urban centers, increasing the tax base by creating value in the property or reviving its value, allocating appropriate and efficient land use to unsuitable land uses or lands without land use, dense development, mixing of land uses, involving the local community, optimal use of existing infrastructure and facilities, developing the road network with emphasis on pedestrian movement and public transportation, optimal use of the width of the road, repair, and organization of old buildings for new uses). Then, results of FARAS and FANP models showed the dispersal principles of functions distribution following the threats and geography of Zahedan city with a value of k=0.599 has the maximum status to rank the principles of passive defense with an emphasis on the status of infill development indexes in Zahedan. Finally, the following policies are suggested along with the obtained results: Involving the private sector participation in the development process, clarifying passive defense goals and objectives for them, anticipating the conditions before and after the infill development indexes, attracting the cooperation of residents, city managers, and local organizations to drive the infill development objectives and its success in passive defense principles. Accomplishing the unified management (coordinated) based on its pivot and determinant status to accomplish the infill development objectives.

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