Research Paper: Planning Rural Regeneration of Suburban Area Emphasizing Passive Defense Approach (Case Study: Fardis Village, Qarchak City, Southeast of Tehran)

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ABSTRACT

Purpose: Rural areas have always been exposed to natural and man-made hazards while they are of special importance due to providing and distribution of countries' food security so that in rural reform projects, the principles of passive defense should be taken into account. In this regard, this study aimed to analyze the role of the passive defense principle on rural regeneration plans of suburban areas.

Methods: This is a descriptive-analytical research and practical applied in terms of objectives. Data were collected using questionnaires and library studies and analyzed through Kolmogorov-Smirnov test, factor analysis, Spearman's correlation coefficients, and coefficients of variation using SPSS software.

Results: The factor analysis test showed that the principles of strengthening and securing vital structures and selecting the optimal scale of dispersion and economic justification of projects have the most and least compatible with rural regeneration plans in Fardis village. The results of Pearson's correlation coefficient test showed that the success of rural regeneration plans in order to achieve the principles of passive defense is evident in the principles of strengthening and securing vital structures. Finally, the results of the variation coefficients and percentage distribution of the items showed a higher percentage of regeneration in the economic, social, environmental, and physical dimensions of most of the items from medium to high ranks.

Conclusion: A prerequisite for the successful regeneration of worn-out rural texture is the integration of sectoral approaches, emphasizing the principles of passive defense.

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1. Introduction

The dominance of natural forces over human life and the low ability of humans to its control caused the construction of settlements using techniques and measures aimed at minimizing the damages. Natural hazards have threatened human settlements, so that it is rare to find a secure place without experiencing damage over history. Therefore, the immunization of population centers coping the natural hazards has particular importance (Mirahmadi & Yadegarzadeh, 2010: 149). The worn-out texture of rural face damages caused by natural hazards (Dayyani, 2022: 263). The rural worn-out texture refers to the areas of the village's legal boundaries with low spatial, environmental, and economic value, which are vulnerable due to physical wear and tear, lack of proper roads, lack of facilities, public services, and rural infrastructure. Owners of worn-out buildings cannot afford their buildings reconstruction, and there is no incentives for reconstructionon. (Motavvaf & Khodaei, 2009: 129). Therefore, the descending trend of environmental quality in worn-out rural textures affecting human well-being and health is a major concern over the world, especially in developing countries (Khan et al., 2015: 368). Therefore, to solve this problem, various actions and programs are usually proposed emphasizing specific aspects. Considering the scope and severity of the problems in these tissues, the efficient approach to coping with the shortcomings and failures is to achieve the goals of sustainable development in the field of improving worn-out rural texture (Davari, 2014: 1). The spatially optimized reconstruction of rural settlements is the key to sustainable rural development (Yang et al., 2016: 413). In recent years, the topic of sustainability and planning has been considered in large part of architecture and urban planning research background. Although sustainability was discussed a lot in the theoretical and philosophical framework, its achieving and promoting strategies in settlements are not clear (Noroldin & Moeeinmehr, 2012: 23). Meanwhile, it is important to pay attention to safety and the capacity to deal with threats in sustainable rural development (Khaki et al., 2020: 2). Therefore, according to the principles of contemporary architecture, which is carried out under the supervision of relevant organizations based on executive rules and regulations, it's essential to follow a comprehensive approach to achieving the objectives of passive defense in rural worn-out texture and applying this plan in all level of decision-making. Small plans in a general and comprehensive system will be able to provide the optimal level of passive defense. Among the small-scale projects which received a lot of attention in recent years. there are the rural regeneration plans. It is necessary to pay attention to the principles of passive defense in these plans. The ability of the system in making internal flexibility, achieving the ability to apply the principles and regulations of passive defense, reducing the damage caused by threats, and the possibility of managing residential spaces in crises. making the necessary preparation to reduce human and financial losses and improving the situation are considered to guide the management system based on the passive defense point of view (Shokouhi & Taremi, 2016: 1304).

In the last decade, the issue of deterioration and improvement of environmental security in worn-out textures has also been raised in Iran. Whereas, the experience of implementing plans to improve the environmental security of worn-out rural textures shows the failure of the programs due to the lack of attention to a mutual, balanced, and integrated approach and the lack of accurate knowledge. Qarchak villages is one of the rural areas of the country facing the problem of worn-out texture over the past years due to its geographical location. Qarchak is one of the densest cities in Tehran, about 15% of its area is located in worn-out texture, especially in peripheral rural. The worn-out texture of Qarchak village is vulnerable due to physical-functional and institutional weakness. However, passive defense considerations in executive plans (such as guide plans, etc.) can increase resistance against natural and anthropogenic threats and lead to stability in critical situations. Fardis village around the city of Qarchak was investigated in this research. Fardis village with distinct rural characteristics is known as a rural settlement in the eastern part of Qarchak. Fardis village acquired the characteristics of urban-rural areas due to the loss of agricultural lands during the process of exploiting resources and land use changes in agricultural, residential and industrial lands. In recent years, 10 rural regeneration projects have been carried out in Fardis village, in which, the passive defense strategy have been neglected. Therefore, the passive defense strategy to decrease damages in the rural worn-out textures with high population (7157 people), immigration to this area due to the high-cost lands in Tehran, and heterogeneous physical textures should be considered by planners and managers.

In this regard, planning and implementation of rural regeneration through a passive defense approach is necessary to decrease the vulnerability of physical organization, preservation of human capital, and decrease human and financial losses.

2. Literature Review

Compliance with the principles of passive defense is considered one of the considerable components of the intervention model in order to reconstruct worn-out textures (Pourahmad et al., 2017: 36). Increasing the proportionality of physic and content with the passive defense principles should be based on the possibilities and limitations of the worn-out areas in the form of physical plans. Regeneration plans are among the micro-scale plans. It is necessary to pay attention to the principles of passive defense in these plans. Regeneration is a considerable strategy for economic and social development in rural areas. Rural regeneration has gradually shifted from large-scale physical transformations to addressing diversity, sustainability, and spatial justice (Xiaoliang et al., 2020: 1). Regeneration is a possibility for sustainable development and smart growth (Benedetto et al., 2020: 8).Therefore, the performance of some measures in order to rejuvenate, enhance, and regenerate dysfunctional tissues promotes a passive defense system and increases management ability facing a crisis. Building instability, the impenetrability of passages, and increased risk of casualties and financial losses facing natural and human crises in worn-out structures reveal that a high percentage of the population in the rural areas of the country are directly exposed to these risks (Aeeni, 2007: 26). Iran is always exposed to all kinds of natural hazards (earthquakes, floods, etc.) and human threats (war) due to its special geographical and political situation (Motavali Habibi & Borgheichi, 2015: 78). Assuming the size of the worn-out rural texture of the country, which is increasing, it is required paying attention to physical safety points in rural plans ٥. In this regard, passive defense leads to the enjoyment of the villages by appropriate land use based on geographical, demographic, and cultural characteristics and the principles of passive defense in different areas, by appreciating the balance and distribution of funds and activities in geography for security. Passive defense in rural regeneration plans is the most stable, cost-effective, and pacifist way to strengthen the social capacities of the villagers in the field of public belief in attaining development and a comprehensive asset for development and rural spatial justice (Rosset & Martínez-Torres, 2012: 77). It can be said that one of the effective approaches in planning the rural regeneration of worn-out texture emphasizing the passive defense in economic, social, physical, and environmental dimensions, is sustainable development. Sustainable rural development contained six general principles. The first principle is based on three economic, social, and environmental dimensions (Shivakshi Jasrotia et al., 2017:

21). The second principle concentrates on the connection of the mentioned dimensions, and intra-generational and inter-generational justice has been emphasized in the third and fourth principles. The fifth principle emphasizes the centrality of the preventive principles of sustainability and sustainable use of resources, and the sixth principle emphasizes the preservation of biological diversity. Sustainable rural development will be achieved by establishing a balance between its dimensions (Dalal Clayton & Bass, 2002:12; Ahmadi, 2020: 32). In this regard, the sustainable development approach is considered one of the important necessities in urban planning; because the worn-out urban textures, which are mostly located in the downtowns of the cities, need intervention and organization. Therefore, it is significant to organize and revitalize worn-out urban structures with a sustainable development approach in rural areas.

The conceptual model of the research has been presented in Figure 1.

There is a limited research background on the principles of passive defense in rural regeneration projects. In this section, internal and foreign research in the scope of the study area have been reviewed. Shahinifar and Amirian (2021) evaluated the indicators of passive defense in the rural areas of Kermanshah province. They found military sites as the susceptible area in terms of seven analyzed criteria. Therefore, it is essential to consider the security of rural areas for site selection of military sites. Farahani et al. (2021) analyzed the position of passive defense principles in urban regeneration plans of urban peripheral spaces (case study: Qarchak city). The results of the t-test in the entire examined item ($p<0.05$) indicated the inappropriate situation of regeneration plans to achieve the principles of passive defense in Qarchak city. Khaki et al. (2020) investigated the strategies for the sustainable regeneration of rural settlements based on the principles of passive defense in the villages of Noor city. The findings showed that the suitable natural substrate for the foothill villages of Noor city is a very suitable opportunity for sustainable development respecting the perspectives of passive defense and the idea of an urban-rural. It is necessary to use this opportunity and other strengths of rural areas in the four physical, social, economic, and environmental aspects. Akbari et al. (2020) investigated rural settlements by a passive defense approach in Qasr- e-Shirin. They found that most of the villages in the northeast of the city were located in suitable areas, and several villages in the southeast of Shamel city (Nalshekan, Vargach, Kale Jub, Meh Rig, and Meh Rase, etc.) were located in inappropriate and risky areas. They suggested no setting down of villagers

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in the center, northeast, and southeast corners as unsuitable boundaries. Hosseini (2019) has evaluated urban regeneration projects from the perspective of passive defense (case study: regeneration project of Kashan historical texture) and concluded urban regeneration projects are the best opportunity to suitable worn-out areas using passive defense principles. Salimi Sobhan et al. (2018) have addressed the location of new rural settlements with passive defense considerations (case study: Qorveh city). Salimi Sobhan et al. (2018) evaluated the site selection of new rural settlements using a passive defense approach (case study: Qorveh city). Their findings showed that more than 50% of the rural settlements in Qorveh city are located in very unsuitable areas, and only 6% are located in very suitable areas. Fallah Tabar and Hosseini Amini (2017) investigated passive defense, the key to creating security in the country's cities and villages (with an emphasis on urban and rural architecture). Fallah Tabar and Hosseini Amini (2017) investigated passive defense, a key to creating security in the country's cities and villages (emphasizing urban and rural architecture). The findings showed passive defense as a key to creating security in the Islamic homeland by observing the relevant principles and techniques and providing the necessary awareness to the members of the society. Pourtahari et al. (2017) evaluated the position of passive defense in the construction of rural settlements in Piranshahr city. The results showed low resistance to coping with a natural disaster in the rural worn-out settlements. Therefore, in using the principles of passive defense, it can be evaluated at an average and below the average level, whereas the stability of rural settlements increased in dealing with natural threats using passive defense principles. Rajabi et al. (2010) investigated the improvement, renovation, and reconstruction of the worn-out rural structures of the Darabad neighborhood. The findings showed no possibility of providing search and rescue in this neighborhood coping natural disasters or unexpected urban incidents, and it has created problems, especially in the field of the road network and urban infrastructure; so the worn-out textures need to follow strategies for regeneration. Cansu and Osman (2020) have investigated sustainability and urban regeneration in Turkey (performance evaluation of the North Ankara Urban Revitalization Project). The contribution of this project to urban sustainability was minimal.

Therefore, more efforts were needed to improve the sustainability of urban regeneration projects in Turkey. Gi-Hyoug et al. (2020) investigated the effects of announcing urban regeneration programs on the value of residential properties: Evidence from Ulsan, Korea. The results showed that the publication of the strategic plan of urban reconstruction in December 2015 had a significant effect on residential values in and around the project sites; whereas, this effect was different in all neighborhoods. The effect of the implementation of the plan around the project sites showed a high level of willingness to participate. Milja et al. (2015) investigated the revitalization of historical buildings in the cities of Nice (Serbia) and Saint Petersburg (Russia) as an approach to protecting cultural and historical heritage. The results showed the necessity of revitalization as the best method in the field of protecting and promoting the cultural value of historical buildings.
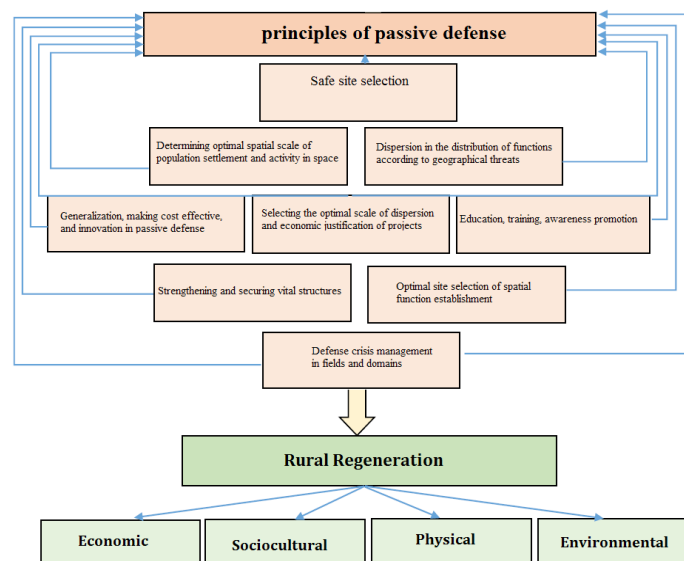

Figure 1. The theoretical model of the research

3. Methodology

The research is applied in terms of purpose and is descriptive and analytical in terms of research design. Data were collected using Questionnaires and library studies. The questionnaire is provided to the statistical population (experts). The subjects (experts in the area of regeneration in Qarchak city, experts in the field of rural planning and development, and academic experts and professors) were selected using simple random sampling (N=70). The most important dimensions and indicators of the passive defense principles in the reconstruction plans of rural areas were categorized as follows (Tables 1 & 2).

The validity of the questionnaire was evaluated using experts' opinions, the questionnaires were filled out through a pre-test (20 questionnaires), and then the main sample size was distributed and completed. The reliability of the dimensions of the questionnaire was assessed by SPSS software using Cronbach's alpha coefficient (Table 3).

Table 1. Indicator and sub-indices of rural regeneration of worn-out textures

Dimension	Criterion
Economic	Productivity and economic prosperity
	Improving the business environment and entrepreneurship
	Attracting and stimulating capital and economic recovery
	Increase job opportunities
	Reducing poverty and class differences in society
	wealth distribution
	Attracting internal capital
	Improving education and professional skills in the human resources
	Improving efficiency and productivity
	Variety of business activities
	The relationship between construction and local reform
	Branding
Sociocultural	Improving the quality of rural life
	Improving social relations
	Overcoming social deprivation
	Attention to the role of people and the potential of popular organizations
	Increasing participation
	Social solidarity
	Crime reduction
	Empowerment
	Capacity building of capabilities
	Education
	Expanding social identity
	Social Security
	Social capital
	Social status
	Reducing poverty and social discrimination
	Providing educational facilities instead of just physical renovation
	Attention to cultural values
	Protection of native wealth
	Promotion of cultural heritage
	Using the tourism industry

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Table 1. Indicator and sub-indices of rural regeneration of worn-out textures

Dimension	Criterion
Environmental	Showing cultural features and events
	Environmental health planning and management
	Supporting future generations
	Promotion of environmental awareness
	Reducing environmental vulnerability
	Reducing the pollution of water sources
	Reducing noise and light pollution
	Reducing visual and psychological pollution
Physical	Promoting the quantitative and qualitative level of buildings and facilities
	Protection of rural infrastructure
	Rural integration
	Design and implementation of rural roads plan
	Protection of historical contexts and indigenous rural wealth

Reference: Yousefzadeh et al., 2020; Pourahmad et al., 2010; Mohammadi et al., 2019; Azizkhani, 2013; Imani khoshkhou & Ayoubi yazdi, 2010

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Table 2. The indicators of the research

Principles	Indicator
Safe site selection	Investigation and analysis of external and internal threats
	Assessment of area susceptibility to threats
	Zoning the location in terms of security and coverage relative to the threat
	Proper distance from the susceptible area
	Using the defense potential of area
Determining optimal spatial scale of population settlement and activity in space	Analysis and review of various functions
	Detailed interaction of three elements: population, performance, and scale of the village
	Scale analyzing in terms of economy, size, and determining the optimal scale
	Distribution and balance of dispersion of industrial, and educational activities
	Creating the most desirable population or activity located in a situation
	Creating a balance between population hubs
Dispersion in the distribution of functions according to geographical threats	Analysis and review of all types of functions in each system and project
	Survey and analysis of threats, and military geography
	Determining safety, protection, and defense standards
	Distribution of critical and sensitive functions
	Separation of functions according to threats
	Avoid combining critical and sensitive functions
Generalization, making cost effective, and innovation in passive defense	Avoiding large-scale critical and sensitive center expansion
	Generalization, dispersion, and expansion of the optimal scale
	Preventing the increase of executive costs in the implementation of projects
	Observing the economic nature of the plans and not imposing high costs
Selecting the optimal scale of dispersion and economic justification of projects	Classification of centers into two states of available and replaceable in case of destruction and inaccessibility of the area
	Define and classification of the security level for each plan against threats

Table 2. The indicators of the research

Principles	Indicator
Education, training, awareness promotion	Utilizing a variety of teaching and learning methods, including books, brochures, and specialized classes
	Increasing people's skills through training exercises
	Crisis prevention, reducing vulnerability during a crisis
	Understanding the importance and necessity of sustainable security, identifying threats
Strengthening and securing vital structures	Reinforcement of vital systems in the projects under operation
	Determining and classification of the security level of each system against threats
	Creating safety in stabilizing systems
	Creating safety and strength according to the importance of each design and structure
	Protection of historical centers against dangers
Optimal site selection of spatial function establishment	Use of resistant technical standards in critical and sensitive structures
	Choosing a safe area in terms of military geography and safe zone
	Determining indicators and standards of passive defense in establishment of functions
Defense crisis management in fields and domains	Examining safe points in the safe geographical area
	Crisis management to manage disasters and consequences
	Prioritizing needs and centers through determining critical and sensitive facilities
	Identification and analysis of threats and general scenarios
	Preparation of threat scenarios in each area

Reference: Tavakolinia et al., 2019; Mohammadpour & Zarghami, 2015; Shakibamanesh & Hashemi Shaharaki., 2009; Naseri Jahromi et al., 2015; Mazrooghi et al., 2017; Jalali & Hashemi Fesharaki, 2010

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Table 3. Reliability of questionnaire dimensions

Cronbach's alpha	alpha coefficient	sample
Principles of passive defense	0.79	30
Rural regeneration	0.76	30

Reference: Research results

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Data were analyzed using SPSS software. Data normality was assessed using Kolmogorov-Smirnov, factor analysis, and Spearman's correlation tests.

Qarchak in the center of Qarchak County is in the Southeast of Tehran province located 20 kilometers from Tehran. Its geographical location is between 51° 35′ E and 35° 24′ N, and its height is about 945m above sea level. Qarchak is limited to Pakdasht city from the northeast, Varamin city from the east and south, and Rey city from the west. Due to its proximity to Tehran and lower cost of housing, this city attracts a considerable of the capital's population. The case of this study is Fardis village in the East of Qarchak. Before the revolution, Fardis village was a green area with 8ha gardens; however, the increase in its population led to the destruction of gardens and agricultural lands, and it changed to an urban peripheral space. The area of this village is 51.77 hectares with 55.34% useful space and 44.66% hectare useless space. The distribution of land uses in rural areas is very unbalanced. Residential land use per capita with 21.2 square meters (11.8%) and road network with 28 square meters per capita (15.5%) have the largest area. The village has a rural texture, and its neighborhood texture is organic. The population of Fardis village is 7157 people.

4. Findings

At first, before examining the regeneration projects, the normality of the principles of passive defense was investigated. The results of the Kolmogorov-Smirnov test indicated the normal distribution of all principles of passive defense. The significance level in all principles was more than the error value (0.05).
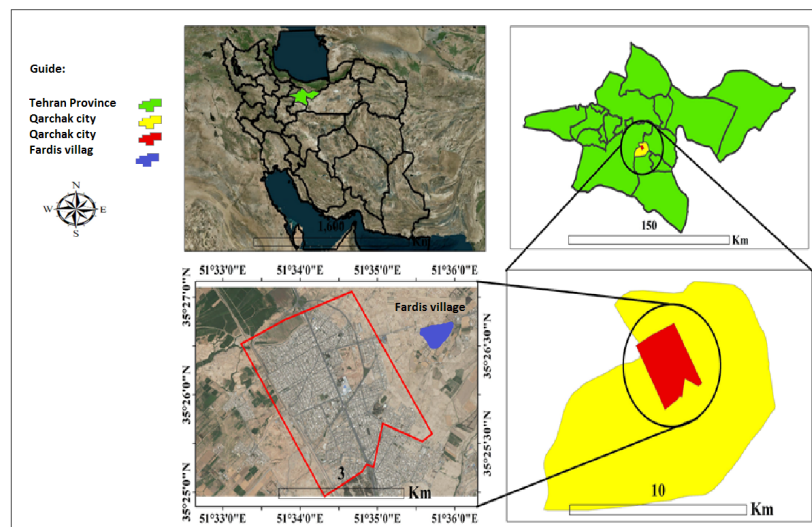
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Figure 2. Study area, Reference: Authors

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Table 4. Kolmogorov-Smirnov test results

Principles	Significance level	Error rate	Kolmogorov Smironov value	Conclusion
Safe site selection	0.289	0.05	1.188	Normal
Determining optimal spatial scale of population settlement and activity in space	0.312	0.05	1.156	Normal
Dispersion in the distribution of functions according to geographical threats	0.276	0.05	1.176	Normal
Generalization, making cost effective, and innovation in passive defense	0.289	0.05	1.188	Normal
Selecting the optimal scale of dispersion and economic justification of projects	0.266	0.05	1.186	Normal
Education, training, awareness promotion	0.276	0.05	1.174	Normal
Strengthening and securing vital structures	0.261	0.05	1.185	Normal
Optimal site selection of spatial function establishment	0.288	0.05	1.180	Normal
Defense crisis management in fields and domains	0.273	0.05	1.183	Normal

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Therefore, parametric analysis was used in this study. Adapting each of the principles and measures with Fardis village was assessed by factor analysis (0.67). Bartlett's test with a 231.342 value was significant at a very good level (0.000), which indicated the data appropriateness to perform the factor analysis test. The results of this test have been analyzed in Table 5.

According to the results, the highest ranks in the principles of safe site selection respectively are:

• Determining optimal spatial scale of population settlement and activity,

• Dispersion in the distribution of functions according to geographical threats,

• Generalization, economic and innovative passive defense,

• Selecting the optimal scale of dispersion and economic justification of projects,

• Choosing the optimal scale of dispersion and economic justification of projects,

• Education, training, awareness promotion,

• Strengthening and securing vital structures,

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• Optimal site selection of spatial function establishment, and

• Defense crisis management in fields and domains

Indicators belonged to the assessment risk of susceptibility areas are as follows:

• Creating the most desirable population or activity located in a situation,

• Analysis and review of various functions in each system and project,

• Preventing the increase of executive costs in the implementation of projects,

• Define and classification of the security level for each plan against threats,

• Utilizing a variety of teaching and learning methods, including books, brochures, and specialized classes,

• Determining and classificating the security level of each system against threats,

• Determining indicators and standards of passive defense in establishment of functions, and

• Crisis management to manage disasters and consequences.

Further, the results of the factor analysis test showed that among the principles of passive defense, the principles with highest to lowest adaptation with rural regeneration plans in Fardis village, are respectively: strength-

ening and securing vital structures, safe site selection, optimal site selection of spatial function establishment, determining the optimal spatial scale of population settlement and activity, dispersion in the distribution of functions according to geographical threats, defense crisis management in fields and domains, education, training, awareness promotion, generalization, making cost-effective and innovation in passive defense, selecting the optimal scale of dispersion and economic justification of projects have.

The correlation level of the passive defense principles with regeneration plans was measured through the Pearson correlation coefficient test. The sign (-) indicates the inappropriate position of the regeneration plan in achieving the desired action and the sign (*) indicates the appropriate position of the regeneration plan in achieving the desired action.

According to the results of Table 7,The low level of passive defense principles in the regeneration plans in the study area was observed in the generalization, dispersion, and expansion of the optimal scale, classification of centers into two states of available and replaceable in case of destruction and inaccessibility of the area, detailed interaction of three elements: population, performance, and scale of the village, survey and analysis of threats, and military geography, define and classification of the security level for each plan against threats, identification and analysis of threats and general scenarios, determining indicators and standards of passive defense in the establishment of functions, examining safe points in the safe geographical area, and understanding the importance and necessity of sustainable security, identifying threats.

Table 5. Factor analysis values (principles of passive defense)

Principles	Special amount	Percentage of variance	Cumulative percentage
Safe site selection	3.456	13.367	13.367
Determining optimal spatial scale of population settlement and activity in space	3.437	13.321	26.688
Dispersion in the distribution of functions according to geographical threats	3.387	12.851	39.539
Generalization, making cost effective, and innovation in passive defense	3.334	12.222	51.761
Selecting the optimal scale of dispersion and economic justification of projects	3.412	13.589	65.351
Education, training, awareness promotion	3.432	13.342	78.692
Strengthening and securing vital structures	3.312	13.443	92.135
Optimal site selection of spatial function establishment	3.334	13.254	105.389
Defense crisis management in fields and domains	3.321	13.443	118.832

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Table 6. Actions that make up factor analysis (principles of passive defense

Principles	Indicator	factor load
Safe site selection	Investigation and analysis of external and internal threats	0.543
	Assessment of area susceptibility to threats	0.675
	Zoning the location in terms of security and coverage relative to the threat	0.654
	Proper distance from the susceptible area	0.665
	Using the defense potential of area	0.643
Determining optimal spatial scale of population settlement and activity in space	Analysis and review of various functions	0.675
	Detailed interaction of three elements: population, performance, and scale of the village	0.611
	Scale analyzing in terms of economy, size, and determining the optimal scale	0.598
	Distribution and balance of dispersion of industrial, and educational activities	0.622
	Creating the most desirable population or activity located in a situation	0.678
	Creating a balance between population hubs	0.643
Dispersion in the distribution of functions according to geographical threats	Analysis and review of all types of functions in each system and project	0.622
	Survey and analysis of threats, and military geography	0.554
	Determining safety, protection, and defense standards	0.561
	Distribution of critical and sensitive functions	0.576
	Separation of functions according to threats	0.561
	Avoid combining critical and sensitive functions	0.578
Generalization, making cost effective, and innovation in passive defense	Avoiding large-scale critical and sensitive center expansion	0.654
	Generalization, dispersion, and expansion of the optimal scale	0.665
	Preventing the increase of executive costs in the implementation of projects	0.721
	Observing the economic nature of the plans and not imposing high costs	0.678
Selecting the optimal scale of dispersion and economic justification of projects	Classification of centers into two states of available and replaceable in case of destruction and inaccessibility of the area	0.665
	Define and classification of the security level for each plan against threats	0.712
Education, training, awareness promotion	Utilizing a variety of teaching and learning methods, including books, brochures, and specialized classes	0.690
	Increasing people's skills through training exercises	0.665
	Crisis prevention, reducing vulnerability during a crisis	0.678
	Understanding the importance and necessity of sustainable security, identifying threats	0.656
Strengthening and securing vital structures	Reinforcement of vital systems in the projects under operation	0.700
	Determining and classification of the security level of each system against threats	0.722
	Creating safety in stabilizing systems	0.670
	Creating safety and strength according to the importance of each design and structure	0.689
	Protection of historical centers against dangers	0.711
Optimal site selection of spatial function establishment	Use of resistant technical standards in critical and sensitive structures	0.654
	Choosing a safe area in terms of military geography and safe zone	0.644
	Determining indicators and standards of passive defense in establishment of functions	0.651
Defense crisis management in fields and domains	Examining safe points in the safe geographical area	0.672
	Crisis management to manage disasters and consequences	0.721
	Prioritizing needs and centers through determining critical and sensitive facilities	0.678
	Identification and analysis of threats and general scenarios	0.653
	Preparation of threat scenarios in each area	0.711

Reference: Research results

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Table 7. The results of the place of regeneration projects in achieving the desired measures using the Pearson correlation coefficient test

Principles	Indicator	The correlation coefficient	The position of regeneration plan in order to achieve action	The correlation coefficient	Rank
Safe site selection	Investigation and analysis of external and internal threats	0.123	-	0.143	7
	Assessment of area susceptibility to threats	0.178	*		
	Zoning the location in terms of security and coverage relative to the threat	0.143	-		
	Proper distance from the susceptible area	0.176	*		
	Using the defense potential of area	0.090	-		
Determining optimal spatial scale of population settlement and activity in space	Analysis and review of various functions	0.087	-	0.231	5
	Detailed interaction of three elements: population, performance, and scale of the village	0.089	-		
	Scale analyzing in terms of economy, size, and determining the optimal scale	0.100	*		
	Distribution and balance of dispersion of industrial, and educational activities	0.110	*		
	Creating the most desirable population or activity located in a situation	0.112	*		
	Creating a balance between population hubs	0.109	*		
Dispersion in the distribution of functions according to geographical threats	Analysis and review of all types of functions in each system and project	0.103	*	0.222	6
	Survey and analysis of threats, and military geography	0.090	-		
	Determining safety, protection, and defense standards	0.103	*		
	Distribution of critical and sensitive functions	0.134	*		
	Separation of functions according to threats	0.165	*		
	Avoid combining critical and sensitive functions	0.174	*		
Generalization, making cost effective, and innovation in passive defense	Avoiding large-scale critical and sensitive center expansion	0.166	*	0.132	9
	Generalization, dispersion, and expansion of the optimal scale	0.081	-		
	Preventing the increase of executive costs in the implementation of projects	0.145	*		
	Observing the economic nature of the plans and not imposing high costs	0.165	*		
Selecting the optimal scale of dispersion and economic justification of projects	Classification of centers into two states of available and replaceable in case of destruction and inaccessibility of the area	0.081	-	0.140	8
	Define and classification of the security level for each plan against threats	0.100	*		
Education, training, awareness promotion	Utilizing a variety of teaching and learning methods, including books, brochures, and specialized classes	0.213	*	0.411	3
	Increasing people's skills through training exercises	0.223	*		
	Crisis prevention, reducing vulnerability during a crisis	0.234	*		
	Understanding the importance and necessity of sustainable security, identifying threats	0.091	-		

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Table 7. The results of the place of regeneration projects in achieving the desired measures using the Pearson correlation coefficient test

Principles	Indicator	The correlation coefficient	The position of regeneration plan in order to achieve action	The correlation coefficient	Rank
Strengthening and securing vital structures	Reinforcement of vital systems in the projects under operation	0.245	*		
	Determining and classification of the security level of each system against threats	0.231	*		
	Creating safety in stabilizing systems	0.1787	*	0.473	1
	Creating safety and strength according to the importance of each design and structure	0.332	*		
	Protection of historical centers against dangers	0.421	*		
Optimal site selection of spatial function establishment	Use of resistant technical standards in critical and sensitive structures	0.231	*		
	Choosing a safe area in terms of military geography and safe zone	0.091	-	0.434	2
	Determining indicators and standards of passive defense in establishment of functions	0.099	-		
	Examining safe points in the safe geographical area	0.189	*		
Defense crisis management in fields and domains	Crisis management to manage disasters and consequences	0.155	*		
	Prioritizing needs and centers through determining critical and sensitive facilities	0.233	*	0.298	4
	Identification and analysis of threats and general scenarios	0.092	-		
	Preparation of threat scenarios in each area	0.098	-		

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The results of the Pearson correlation coefficient showed the successful principles in the rural regeneration as follows: strengthening and securing vital structures, optimal site selection of spatial function establishment, education, training, awareness promotion, defense crisis management in fields and domains, determining the optimal spatial scale of population settlement and activity, dispersion in the distribution of functions according to geographical threats, safe site selection, selecting the optimal scale of dispersion and economic justification of projects, and generalization, making cost-effective, and innovation in passive defense.

In the following, each dimension of regeneration projects in Fardis village has been examined. Regeneration included multiple socio-cultural, economic, physical, and environmental dimensions. Paying attention to the mentioned dimensions is a proper strategy for a successful regeneration plan. In this regard, the dimensions were analyzed from the perspective of Fardis village residents through field studies. Therefore, in order to obtain the score of regeneration projects dimensions (economic, socio-cultural, environmental, and physical), the coefficient of variation test and percentage distribution were used to obtain the rank of economic, sociocultural, environmental, and physical dimensions of the rural regeneration plan.

According to the data mentioned in Tables 8, rural regeneration has received a higher percentage in some items of economic dimension (out of 8 items among 12 items), and in all the items of social, environmental, and physical dimensions. According to the findings. The coefficient of variation was calculated and the items were ranked based on it. In the economic dimension, the items of relationship between construction and local reform have been assigned the first and second ranks. In the social dimension, the items of overcoming social deprivation and increasing participation were obtained the first and second ranks. The items of rural integration and promoting the quantitative and qualitative levels of buildings and facilities received the first and second ranks.

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Table 8. The score of regeneration projects dimensions (economic, socio-cultural, environmental, and physical), the coefficient of variation test and percentage distribution

Dimension	Row	Criterion	standard deviation	Average	Coefficient of variation	Rank	Very low	Low	Medium	High	Very high	Rank
							Percentage of regeneration status					
Economic	1	Productivity and economic prosperity	2.741	15.42	0.177	5	1.07	4.11	3.13	21.11	39.23	3.83
	2	Improving the business environment and entrepreneurship	2.503	14.41	0.173	4	1.13	4.03	3.23	23.03	41.33	4.00
	3	Attracting and stimulating capital and economic recovery	4.387	20.77	0.211	9	1.03	2.22	1.89	9.09	25.13	2.87
	4	Increase job opportunities	2.986	18.10	0.180	6	1.21	2.23	2.34	14.10	3.31	3.32
	5	Reducing poverty and class differences in society	4.654	22.19	0.241	11	1.04	1.32	1.22	9.09	21.32	2.43
	6	wealth distribution	4.456	21.87	0.231	10	1.09	2.22	1.65	10.11	24.10	2.67
	7	Attracting internal capital	2.254	10.78	0.209	8	1.02	2.10	2.09	11.11	27.21	2.00
	8	Improving education and professional skills in the human resources	0.875	1.873	0.451	12	1.11	1.05	1.21	8.09	20.11	2.32
	9	Improving efficiency and productivity	2.986	16.04	0.187	7	1.11	3.13	1.11	13.09	28.31	3.13
	10	Variety of business activities	2.544	15.50	0.164	3	1.12	5.11	4.32	34.01	45.33	4.16
	11	The relationship between construction and local reform	2.401	26.09	0.092	1	2.28	5.23	2.11	36.11	56.25	4.75
	12	Branding	3.343	17.03	0.154	2	1.65	1.5	9.95	37.56	46.4	4.45
Sociocultural	1	Improving the quality of rural life	2.342	13.43	0.167	6	1.08	1.11	3.11	14.08	40.12	3.90
	2	Improving social relations	2.243	13.34	0.156	4	1.12	3.12	3.21	15.15	41.34	4.21
	3	Overcoming social deprivation	2.231	13.23	0.154	1	1.34	3.45	3.98	19.1	15.23	4.65
	4	Attention to the role of people and the potential of popular organizations	4.321	16.54	0.213	10	1.12	1.08	3.14	23.31	37.00	3.51
	5	Increasing participation	3.543	18.77	0.187	8	1.00	1.11	3.05	13.22	38.00	3.72
	6	Social solidarity	4.432	17.45	0.212	12	1.12	1.09	1.08	10.04	35.43	3.21
	7	Crime reduction	3.234	13.34	0.148	2	1.21	3.33	3.67	18.1	4.13	4.43
	8	Empowerment	3.321	14.65	0.165	5	1.09	1.21	3.13	15.13	41.32	4.00
	9	Capacity building of capabilities	4.432	17.45	0.212	9	1.11	1.03	3.12	13.43	38.12	3.61
	10	Education	4.453	17.66	0.221	3	2.19	5.11	4.32	34.01	45.33	4.16
	11	Expanding social identity	3.432	17.45	0.212	9	1.11	1.03	3.12	16.43	38.12	3.61
	12	Social Security	3.321	14.65	0.165	5	1.11	3.03	2.53	15.11	34.10	3.43
	13	Social capital	2.311	14.54	0.151	3	1.19	3.34	3.34	16.13	43.13	4.32
	14	Social status	3.234	13.34	0.148	2	1.21	3.33	3.67	18.1	44.13	4.43
	15	Reducing poverty and social discrimination	3.453	18.65	0.178	7	1.03	1.04	3.08	13.11	39.05	3.82

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Table 8. The score of regeneration projects dimensions (economic, socio-cultural, environmental, and physical), the coefficient of variation test and percentage distribution

Dimension	Row	Criterion	standard deviation	Average	Coefficient of variation	Rank	Percentage of regeneration status					Rank
							Very low	Low	Medium	High	Very high	
Sociocultural	16	Providing educational facilities instead of just physical renovation	5.443	14.65	0.243	12	1.12	1.09	1.08	10.04	35.43	3.21
	17	Attention to cultural values	4.321	16.54	0.213	10	1.12	1.08	3.14	12.31	37.00	3.51
	18	Protection of native wealth	3.433	14.65	0.167	6	1.08	1.11	3.11	14.08	40.12	3.90
	19	Promotion of cultural heritage	3.412	13.43	0.213	10	1.12	1.08	3.14	12.31	37.00	3.51
	20	Using the tourism industry	3.433	14.65	0.167	6	1.08	1.11	3.11	14.08	40.12	3.90
	21	Showing cultural features and events	4.436	18.56	0.216	11	1.00	1.00	2.08	11.11	36.83	3.34
Environmental	1	Environmental health planning and management	3.343	16.45	0.176	2	1.13	1.04	1.12	14.12	44.23	4.21
	2	Supporting future generations	4.443	19.78	0.231	7	1.03	1.11	1.14	13.00	39.12	3.56
	3	Promotion of environmental awareness	3.231	15.33	0.167	1	1.21	1.11	1.12	15.16	45.43	4.41
	4	Reducing environmental vulnerability	3.354	17.77	0.180	3	1.04	1.11	1.03	14.03	44.34	4.11
	5	Reducing the pollution of water sources	3.389	18.89	0.210	5	1.01	1.14	1.03	13.00	42.12	3.87
	6	Reducing noise and light pollution	4.412	19.67	0.221	6	1.00	1.01	1.00	13.12	41.00	3.71
	7	Reducing visual and psychological pollution	3.367	17.87	0.197	4	1.11	1.21	1.12	13.01	43.31	4.00
Physical	1	Promoting the quantitative and qualitative level of buildings and facilities	3.412	16.78	0.178	2	1.11	1.02	1.11	13.08	43.00	3.87
	2	Protection of rural infrastructure	3.654	18.51	0.200	3	1.00	1.01	1.00	12.12	42.00	3.56
	3	Rural integration	2.231	13.43	0.124	1	2.11	2.02	2.11	15.21	46.11	4.21
	4	Design and implementation of rural roads plan	3.764	18.65	0.213	4	1.12	1.00	1.01	12.00	41.11	3.43
	5	Protection of historical contexts and indigenous rural wealth	3.812	19.76	0.220	5	1.11	1.01	1.00	11.01	40.01	3.31

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5. Discussion

Regeneration is one of the important approaches to intervention in vulnerable areas, which can be considered by emphasizing the social, economic, physical, cultural, and environmental dimensions to stop the process of decline and informal growth. Rural regeneration is a significant policy for the development of rural areas. The urban peripheral space of Fardis is located near Qarchak city (one of the most immigrant cities in the suburbs of Tehran). Over the past few decades, due to the low-cost lands and housing in Qarchak, it has been affected by immigration, which has led to the unplanned growth of this village. The physical-spatial consequences of the migrations are evident in the constructions, improper passages, and used materials in buildings. In this regard,

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this study aimed to analyze the role of the passive defense principle on rural regeneration plans of suburban areas in Fardis village.

Also, the results of the factor analysis test showed that among the principles of passive defense, the principles of strengthening and securing vital structures, safe site selection, optimal site selection of spatial function establishment, determining the optimal spatial scale of population settlement and activity, dispersion in the distribution of functions according to geographical threats, defense crisis management in fields and domains, education, training, awareness promotion, generalization, making cost-effective and innovation in passive defense, selecting the optimal scale of dispersion and economic justification of projects have the highest and lowest adaptation with rural regeneration plans in Fardis village, respectively.

The results of Pearson's correlation coefficient test showed the success of regeneration plans in order to achieve the principles of passive defense in the following principles: strengthening and securing vital structures, optimal site selection of spatial function establishment, education, training, awareness promotion, defense crisis management in fields and domains, determining the optimal spatial scale of population settlement and activity in space, dispersion in the distribution of functions according to geographical threats, safe site selection, selecting the optimal scale of dispersion and economic justification of projects, and generalization, making cost-effective, and innovation in passive defense.

The results of the variation coefficients and percentage distribution of the items showed a higher percentage of regeneration in the economic, social, environmental, and physical dimensions of most of the items with medium to high ranks. A prerequisite for the successful regeneration of worn-out texture emphasizing the principles of passive defense is the integration of sectoral approaches. Although piecemeal approaches may solve the problems in the short term, the solutions that lead only to changing the physical structure, regardless of social issues, are likely to cause more wear and tear. Even in some cases, the national plans and policies were based on integration and were not necessarily implemented in practice. Implementation of integrated policies is a challenge that requires continuous training during implementation. The integrated nature of regeneration in order to achieve the principles of passive defense should be strengthened by creating appropriate institutions to guide the mentioned process toward improving the quality of rural life. The institutions should be managed and directed through

political participation. Therefore, coordination, cooperation, and strategic agreement are the most important factors to achieve passive defense principles in reconstruction projects. The findings of this study are in accordance with the findings of Shahinifar & Amirian (2021), Khaki et al. (2020), Fallah Tabar & Hosseini Amini (2017), and Pourtaheri et al. (2017). The following suggestions have been provided taking into account the findings:

- Land assignment, and empowering the villagers by providing low-interest loans for construction, documenting rural residential units to building according to the supervision of the Housing Foundation;

- Reconstruction of buildings with more than 15 years history;

- Using the unused lands in the village to create sports places and green spaces;

- Provision of health and educational facilities and equipment instead of just their reconstruction;

- Attracting various financial and credit resources for the renovation of worn-out textures and strengthening buildings;

- Making proper background for villagers' participation in order to use the maximum potential of rural regeneration through a passive defense approach.

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Conflict of Interest

The authors declared no conflicts of interest.

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